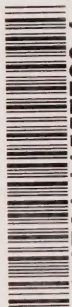


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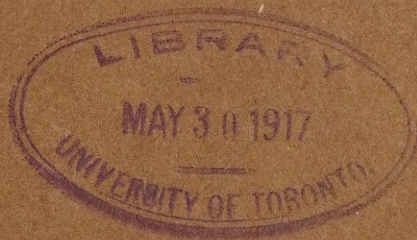


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ANNUAL REPORT

1916





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ANNUAL REPORT

—OF THE—

Harbour Commissioners of Montreal

For the Year 1916



COMMISSIONERS

W. G. ROSS, Esq., President

FARQUHAR ROBERTSON, Esq. Brig.-General A. E. LABELLE

OFFICIALS

MAJOR DAVID SEATH, SECRETARY-TREASURER
M. P. FENNELL, JR., ASSISTANT SECRETARY

F. W. COWIE, M. INST. C. E., CHIEF ENGINEER
SIR JOHN KENNEDY, CONSULTING ENGINEER
T. W. HARVIE, ASSISTANT CHIEF ENGINEER

J. NEHIN, GEN'L SUPT. OF GRAIN ELEVATORS
GEO. GENDRON, MECHANICAL SUPERINTENDENT

CAPT. T. BOURASSA, HARBOUR MASTER
CAPT. J. F. SYMONS, DEPUTY HARBOUR MASTER

GEORGE E. SMART, COMPTROLLER

ROBT. A. EAKIN, PAYMASTER AND WHARFINGER

J. VAUGHAN, SUPT. OF RAILWAY TERMINALS
R. L. MERCIER, ASST. SUPT. OF RAILWAY TERMINALS

L. H. A. ARCHAMBAULT, PURCHASING AGENT

Harbour Commissioners of Montreal

MONTREAL, February 1st, 1917.

To Hon. J. D. HAZEN, K.C., M.P.,
Minister of Marine and Fisheries,
Ottawa, Ont.

Sir,—

In compliance with Section 51 of the Commissioners' Act 57-8 Victoria, Chapter 48, the Harbour Commissioners of Montreal herewith respectfully submit their Annual Report of Operations for the year ended 31st December, 1916.

We have the honour to be,

Sir,

Yours very respectfully,

W. G. ROSS, President.

F. ROBERTSON,

A. E. LABELLE,

Commissioners.

Harbour Commissioners of Montreal

ANNUAL REPORT 1916

♦ ♦ ♦ ♦

Montreal Harbour—1916

THE returns for the season of 1916 record the minimum of capital expenditure on construction that has obtained since 1901, and the maximum of operations for revenue account in the history of the port.

CONSTRUCTION PROGRAMME.

The chief items of construction are dredging of channels and approaches, the expenditure for which in 1916 was about one-third the average for the past several years. The construction of wharves, including dredging and filling, was also reduced to about one-third the usual amount.

Elevator construction was also kept low; the only item which was continued on the usual basis was the construction and extension of Harbour Terminal Railways, as urgently required.

The total construction expenditure for the year amounted to about \$800,000, while similar expenditure for 1913 was \$2,400,000 and for 1912 nearly \$3,000,000.

GROWTH OF TRAFFIC.

"The steadiness in the growth of traffic on the river "is perhaps best seen in the annual accounts of the Clyde "Navigation Trust, the authority which controls the "harbour and docks of Glasgow and the greater part of "the navigable river. Twenty-five years ago the revenue "was £354,580. Last year it reached a total of £705,976. "It will thus be seen that in the past quarter century "the annual revenue of the Trust has almost exactly "doubled. The increase in revenue during 1915-16 was "derived mainly from dues on goods which, owing to "increased rates, made since the war began, showed an "advance of £46,956." (From *Shipping World*, Jan. 10th, 1917.)

The records of Montreal Harbour for the same period of 25 years, with no increase of rates, may be given as follows:—

| | |
|---|---------------|
| Total receipts on Revenue Account 1891... | \$ 263,965.95 |
| Total receipts on Revenue Account 1916... | 1,813,872.94 |
| Increase in 25 years nearly seven times. | |

SEASON OF NAVIGATION 1916.

Following winter conditions, resulting in exceptionally high water in the Harbour, caused by ice jams, the ice moved out, without damage, on April 20th, 1916.

The first vessel in the Harbour was the ferry "Louis Philippe" on April 22nd, 1916. The first arrivals in the Harbour from lower river ports were the "Gaspesian" and the "Lady Grey" on April 24th.

The first vessel arriving from the sea was the S.S. "Bayern," Captain Cernigliaro Domenico, which reached Montreal on May 1st.

The yearly custom of presenting a cane to the Captain of the first vessel arriving from sea was honoured this year.

On the 3rd May, Capt. Cernigliaro Domenico was invited to the Board Room of the Harbour Commissioners and in presence of a few of the Harbour officials Mr. W. G. Ross, President, made the presentation, after a few words of congratulation, to which Capt. Domenico replied in English.

The last vessel to depart for sea was the S.S. "Ranney," which sailed from Montreal on December 11th, the same date as the last departure for sea last year.

The close of the season was again marked by two weeks of exceptionally fine, mild and clear weather for navigation, occurring after the usual early cold snap of three days, from November 25th to 27th. Ice formed rapidly in the river during the early cold spell, but with



View showing lake vessels near entrance to Lachine Canal

the excellent ice-breaking steamers and tugs now available, there was absolutely no cause for alarm. In spite of this, however, reports of ice resulted in the cancellation of sailings to Montreal, which might well have continued with perfect safety until December 10th.

It would seem that the shipping interests might rely with more confidence on the efforts being made by the Canadian Government and the Harbour Commissioners to secure safe navigation for two weeks earlier in the Spring and later in the Autumn. Thirty years ago, before the advent of ice-breaking steamers or even steel tugs, several ships were frozen in the river in November. At the present time two excellent ice-breaking steamers of large size are available for breaking any possible early winter ice. Shore ranges indicating the courses are available for almost every reach in the river.

The Harbour Commissioners' tug "Sir Hugh Allan" was specially designed for ice breaking. The only possible danger therefore would result from sudden snowstorms, which are quite as frequent at the middle of November as they are on December 1st, so that navigation might well be prolonged to Montreal at least until the end of the first week in December.

ST. LAWRENCE NAVIGATION.

The following editorial from the *Montreal Gazette* makes a fitting close to this brief résumé of the season of 1916 in Montreal Harbour:—

"It is a remarkable fact that in the season just ended "not a single accident to a sea-going vessel occurred in "the River St. Lawrence. Of no other season in the last "sixty-two years could the same boast be made. For

“the good record, the various aids to navigation are
 “to be given chief credit, and extra care on the part of
 “navigators must also have had a lot to do with the
 “matter. A few such seasons in succession should have
 “an effect on the Marine Insurance rates which ship-
 “pers are wont to complain of.”

By “accident” is meant serious casualty or loss of vessel. There were two or three groundings, but none of them in any way attributable to the Ship Channel or depth of water. The remarkable fact is that in a district of inland navigation covering, from the Sea to Montreal, a distance of 1,000 miles, there could be so few groundings, collisions or wrecks. The skillful navigators and the wonderfully increasing carefulness and efficiency of the Quebec and Montreal pilots is a matter for recognition throughout Canada.

CANADIAN VICKERS LIMITED DRY DOCK.

That shipbuilding has now become an integral part of the Port's activities is sufficiently shown by the fact that the Canadian Vickers Limited completed during the year the splendid new ice-breaker for the Dominion Government, although afterwards turned over to the Russian Government for service at Archangel or elsewhere; the great \$850,000 dredge No. 16, which is one of the two largest dredges built in the world; a large number of smaller craft for the Navy and other buyers, and has now in hand two great steel cargo steamships which are being built for Norwegian buyers. In addition to this, the usefulness of the works of this Company to the Port was again demonstrated by the number of large ocean-going vessels which were given the opportunity

to dock in the dry dock either for repairs or overhauling. At a banquet given in connection with the launching of the dredge, it was stated that the Company looks confidently to the continuation after the war of their ship-building business on a large scale.

Ships docked for repair during season.

| | |
|---|--|
| Government Dredge No. 2. | Car Ferry "Leonard." |
| S.S. "Dollard." | S.S. "D. A. Gordon." |
| S.S. "Dundee." | S.S. "Lady Grey." |
| S.S. "Acadian." | S.S. "Magnolia." |
| S.S. "Lackawana." | S.S. "Sarnor." |
| S.S. "Inland." | S.S. "Mapleton." |
| S.S. "Selwyn Eddy." | S.S. "Maryland." |
| S.S. "Acadia." | S.S. "Rapids Prince." <small>Docked twice.</small> |
| S.S. "English Monarch." | S.S. "Laval." |
| S.S. "Zillah." | S.S. "Corsica." |
| S.S. "Louis Philippe." <small>Docked twice.</small> | S.S. "Kalibia." |
| H.M.S. "Carnarvon." | S.S. "Lake Manitoba." |
| S.S. "Arabian." | S.S. "Fairfax." |
| S.S. "Kaduna." | S.S. "Hungerford." |
| S.S. "Thomas J. Drummond." | S.S. "Norfolk." |
| Government Dredge No. 8. | S.S. "Mikula Selianinovitch." |

Vessels repaired afloat during season.

| | |
|--------------------|---------------------|
| S.S. "Dunedin." | S.S. "Bangor Head." |
| S.S. "Nascopia." | S.S. "Munista." |
| S.S. "Florence." | Barge No. 56. |
| Yacht "Puncher." | S.S. "Harmaton." |
| S.S. "Kandy." | S.S. "Romera." |
| S.S. "Pakaki." | S.S. "Karkoura." |
| S.S. "Huntress." | S.S. "Glen Ellah." |
| S.S. "Strathcona." | |

DEPTH OF WATER FOR NAVIGATION.

The average depth of water in the Harbour Channel in—
May was 37'3" or 1'10" higher than the average for the
preceding fifteen years.

June, 35'8" or 1'6" higher than the average for the pre-
ceding fifteen years.

July, 32'8" or 7" higher than the average for the preced-
ing fifteen years.

August, 31'1" or equal to the average for the preceding
fifteen years.

September, 30'2" or 3" lower than the average for the
preceding fifteen years.

October, 30'0" or 5" lower than the average for the pre-
ceding fifteen years.

November, 30'2" or 2" lower than the average for the
preceding fifteen years.

The following table gives the average monthly depth
of water in the Ship Channel in the Harbour during the
season of 1916, as compared with the records of 1915,
and also the monthly averages of the depth of water on
the old No. 1 Lachine Canal Lock Sill:—

| | Depth on old Lock Sill Depth in Harbour Lachine Canal. Channel. | | | |
|----------------|--|---------|---------|---------|
| | Average | Average | Average | Average |
| | 1901-15 | 1916 | 1915 | 1916 |
| May..... | 20' 0" | 21'10" | 31' 9" | 37' 3" |
| June..... | 18' 9" | 20' 3" | 30' 3" | 35' 8" |
| July..... | 16' 8" | 17' 3" | 29' 7" | 32' 8" |
| August..... | 15' 8" | 15' 8" | 29' 6" | 31' 1" |
| September..... | 15' 0" | 14' 9" | 29' 6" | 30' 2" |
| October..... | 15' 0" | 14' 7" | 29' 6" | 30' 0" |
| November..... | 14'11" | 14' 9" | 28'11" | 30' 2" |

It will be seen from the above table that the depth of water was considerably higher than in 1915, and that it quite held up to the average for the period from 1901 to 1915.

DRAUGHT OF VESSELS TO MONTREAL.

The Harbour Commissioners' Annual Report for 1891 contains the following paragraph:—

"The later part of last season was remarkable for "the low water in the St. Lawrence. The lowest point "reached was 15 inches lower than the datum level from "which the 27 ft. 6 in. channel is based. During the "lowest water, however, S.S. "Sarmatian," drawing 25 ft. "6 in., left the Harbour and passed down safely. On the "18th June the S.S. "Vancouver" passed down, drawing "26 ft. 8 in., the deepest draught recorded from the Har- "bour during the year."

For the year 1916, 25 years later, the deepest draught vessel which sailed from Montreal was the S.S. "Moltke," on July 8th, having a draught of 31 ft. 6 in. During the week of lowest water, the S.S. "Scandinavian" passed down, drawing 27 ft. 6 in.

THE SUEZ CANAL.

"It is interesting, as a comparison with the draught of "vessels in the St. Lawrence, to note from a statement made "on behalf of the Suez Canal Company in May, 1916, "that although, for the sake of safety, ships drawing "more than 30 ft. are not at present allowed to pass "through the Canal, the depth of the waterway was at "no point less than 33 ft., was nearly 35 ft. on the great- "est stretch of the Canal, and was 40 ft. at certain points.

“During the first three months of 1916, out of 842 ships
 “which passed through the Canal, none had a draught
 “exceeding 29 ft., and only four drew between 28 ft.
 “and 29 ft.”

(From *The Engineer*, Jan. 12th, 1917.)

HUDSON'S BAY COMPANY.

The entrance of the Hudson's Bay Co., the firm whose historical and business associations in Canada are so well known, into the export and shipping trade in the Harbour of Montreal, marks another new epoch which augurs well for the present as well as for the future.

The Hudson's Bay Co., which for many years has occupied the position of Traders in Canada, have, with their excellent organization and world-wide connection, very greatly extended their ownership and control of ships and tonnage and have inaugurated a business very favourable to Canada, for export to France of large quantities of wheat, flour, Julienne, wire, asbestos, sugar, etc.

Representations being made by the Harbour Commissioners to this company that business could be handled favourably in Montreal, the company, after investigation, inaugurated a Montreal service which, commencing in June, reached for the season a total of 61 vessels sailing from the Port of Montreal, having a total registered tonnage of 232,605 tons.

The following is a recapitulation, received from the Export Agent, of the season's shipments:—

| | | Tons | Cwt. | Qrs. | Lbs. |
|-------------------|-------------------|---------|------|------|------|
| Wheat..... | 9,927,284-50 bus. | 265,909 | 8 | 1 | 15 |
| Flour..... | | 42,349 | 0 | 1 | 12 |
| Julienne..... | | 1,702 | 18 | 3 | 0 |
| Wire, barbed.... | 1,690-5-2-1 | | | | |
| do annealed... | 3,295-6-3-0 | 4,985 | 12 | 1 | 1 |
| Wire, steel..... | 720-1-3-22 | | | | |
| do copper, etc. | 284-4-3-8 | 1,004 | 6 | 3 | 2 |
| Nails..... | | 467 | | | |
| Benzol..... | | 130 | | | |
| Carbolic Acid.... | | 30 | | | |
| Asbestos..... | | 535 | 14 | 1 | 4 |
| Sugar..... | | 6,000 | | | |
| | | 323,114 | 0 | 3 | 6 |

The following letter may be of interest in showing the satisfactory service during the season in Montreal Harbour, and negotiations are now being made by the company to increase their appliances for the very greatly increased business expected in 1917.

HUDSON'S BAY COMPANY

Export Department.

Nov. 11th, 1916.

12169

"W. G. Ross, Esq., Pres.,

"Harbour Commissioners,

"Montreal.

"Dear Sir:—

"I have pleasure in advising you that I am to-day
 "in receipt of the following cable from the Governor
 "and Committee in London:—

"Please convey to Montreal Harbour Commissioners
 "and the Officers of that Department our hearty thanks

“for their co-operation during the season. We are ad-
 “vising our Principals of the records of loading which
 “have been established, who have already informed us
 “that the results are most satisfactory and greatly appre-
 “ciated.

“I am, Sir,

“Yours truly,

“(Signed) N. H. BACON,

“Export Agent.”

The following letter from the Deputy Governor of the Hudson's Bay Co. records the despatch their vessels received in Montreal Harbour:—

11th December, 1916.

“Dear Sir:—

“With the close of the Montreal season we have now
 “been able to tabulate the results. For your information
 “we enclose a list showing the number of steamers which
 “have loaded at Montreal this year, giving the number
 “of days in port for each steamer. From our calcula-
 “tion, the average works out at 3.8 days per steamer,
 “which is a highly creditable performance.

“We are placing the particulars before the Minister
 “of Commerce, and feel sure that he will join us in ex-
 “pressing his appreciation to you and your staff, as well
 “as to the Montreal Harbour Commissioners for the
 “excellent results achieved.

“Yours faithfully,

“For the Governor and Committee
 of the Hudson's Bay Company,

“(Signed) CHARLES V. SALE,

“Deputy Governor.”

QUICK DESPATCH AT OUR PORTS.

"An important Memorandum, addressed to dock authorities in this country by the Port and Transit Executive Committee, emphasises the urgent necessity for giving better despatch to vessels, so that more frequent voyages may be made and a greater volume of cargo carried by each vessel in the course of her year's trading. From time to time we have called attention to the importance of this matter and the obvious saving in ships and cargo space which a quick "turn round" at the port ensures. No shipping man needs to be told that the moment a ship is tied up at the quay her primary value as a cargo carrier ceases until she once more clears the port. Hence any delay in her stay at a port is uneconomical, and particularly so at this moment when the supply of shipping tonnage available, after war demands have been satisfied, is far from sufficient. The Memorandum states that the rate of discharge or loading which was deemed satisfactory in times of peace must not be taken as the limit of what is possible and should be obtained in time of war. No custom of a port or trade practice, it adds, must be allowed to interfere with obtaining the utmost possible despatch."

(From *Shipping World*, Jan. 10th, 1917.)

OVERSEAS SERVICE.

This Service, as conducted by Mr. A. H. Harris, Director, may be recorded as another successful feature of business in Montreal Harbour for 1916.

The Director has stated that the despatch in Montreal Harbour resulting from the exceptionally large

double-storey transit sheds, the excellent switching service and other facilities, has been remarkably good, the average for loading in the Harbour being less than four days for the season. This item of despatch, when the charter rate for vessels is so very high, must have meant a very great deal for a large number of ships.

The direction and operation of this service required the utmost care and attention. The uncertainty of the date of arrival of vessels, the changes in orders for shipment and the congestion in railway terminals have been the cause of great anxiety from time to time. Only the efficient direction of the service and the exceptional features of adaptation of the Harbour could have resulted in seven months of exceptionally heavy business without a single embargo in Montreal Harbour.

It must also be considered that this large number of ships were completely loaded with package freight, no bulk grain, which usually forms a large proportion of Montreal Harbour business, being included in their cargoes.

SHIPPING.

In all, 698 sea-going vessels arrived in port during the season, with a tonnage of 2,134,456 tons, as against 815 vessels with 2,261,374 tons in 1915, this showing being due to the commandeering and retaining by the British Admiralty for the entire season of important sections of the fleets which, under normal conditions, would have been used to supply the Port of Montreal, as well as to the fact that the maximum results were not procured even from the available tonnage on account of the delays in unloading experienced in the congested overseas ports.

The greatest number of sea-going vessels in Port at any one time occurred on the 12th September, when there were 41 berthed in the Harbour.

The usual statements are hereto appended showing:—

1. The number and tonnage of all vessels.
2. Classification of transatlantic vessels.
3. Classification of vessels from the lower St. Lawrence and Maritime Provinces.
4. Number and tonnage of sea-going vessels and their different nationalities; also the number of men that manned the vessels.
5. The opening and closing of navigation, the first arrival and the last departure of vessels, and the greatest number in port at one time.

All things considered, the results of the season's shipping can be viewed with a good deal of satisfaction, and shippers and the public generally, to whom the steady flow of commerce between Canada and Great Britain means so much, must feel deep gratitude for an efficient navy, which alone has made it possible to maintain uninterrupted communication with the Motherland.

POLICE DEPARTMENT.

Organized in 1913, the Harbour Police Force, consisting of three officers and 42 constables, all uniformed and armed, regulates the traffic on the wharves, maintains order and protects life and property within that portion of the Harbour of Montreal situated between the entrance of the Lachine Canal and the Sutherland Pier, a distance of $3\frac{1}{2}$ miles.

Following the rule established on the declaration of war, at the beginning of August, 1914, admission to the

Harbour during the past year was restricted to persons holding special passes issued by the Commissioners, which necessitated the placing of police guards at all entrances, their principal duties being to ward off undesirables or suspicious characters, as well as to regulate vehicular traffic at these points. The utility of their efforts in this direction may be judged from the fact that no accident, even of a minor nature, occurred on that portion of the Harbour under their care, notwithstanding the free movement of railway and vehicular traffic.

The services of the Harbour Police were repeatedly requisitioned by the various shipping companies during the season.

115 persons were arrested and brought before magistrates and recorders for different minor offenses during the season, in addition to which 3 arrests were made in connection with the smuggling of opium, in the dealing with which offense the efforts of the Harbour Police were most successful.

RAILWAY TRAFFIC DEPARTMENT.

Winter Operations.

The winter operations during the year 1916 were confined to the handling of such traffic as prevailed in 1915, and, excepting an abnormal increase in the business, no new feature developed which is worthy of comment.

From January 1st to the opening of navigation, 25,000 cars more were handled this year than in 1915, and in face of an average monthly handling of more than 10,000 cars, the accepted idea that this Port is practically closed during the Winter can no longer be entertained as far as the railway terminals are concerned.

Car Handling.

From the opening of navigation, and as the season advanced, the volume of traffic increased to proportions exceeding anything ever experienced in this Port. The conditions that are responsible for the exceptionally heavy traffic are well known, being identical to those existing in 1915, to which, however, was added the handling of over 30,000 cars of grain for the Harbour elevators, and from this source a great proportion of the increase in car handling has been derived.

There is one salient feature in the handling of local traffic that might be dwelt upon, and that is the advantages offered by these Terminals in the handling of traffic to commercial industries adjoining the Harbour, one industry standing out pre-eminently with traffic returns five times greater than in 1915.

With a total increase of more than 50,000 cars handled, there need be no surprise that the facilities in the Harbour were taxed to their utmost nor that there resulted temporary congestion, to which is attributable, with the high cost of coal and the shortage of vessels, the relatively higher cost of operation.

To meet the demand of motive power, the Commissioners purchased two locomotives of a similar type to those in service and, at the opening of navigation next year, we will consequently be in better position to cope with the exigencies of the service.

The total handling during the year amounted to 234,439 cars, an increase of 76,959 cars over the year 1915.

Traffic at Sheds.

Notwithstanding the decrease in import freight, 51,576 cars were handled during 1916 directly to and from the sheds, as compared with 43,096 cars in 1915.

Care of Plant.

The necessary repairs to railway plant and equipment, made heavier by constant use, were effected in the Commissioners' shops. The work of altering the locomotives to a type more suitable to the necessities of transportation in the Harbour was completed this year, all the locomotives now being more suitable for the increased territory over which they are to operate.

Growth of Railway Department.

From the following statement, showing the number of cars handled yearly since the Department was organized in 1907, it will be observed that the growth of railway traffic in this Port is continual, and while the conditions which account for the most successful season just brought to a close may have been unusual, the Commissioners feel that they can confidently look for a continuance of increased railway business.

| | |
|-----------|---------|
| 1907..... | 70,856 |
| 1908..... | 60,266 |
| 1909..... | 75,636 |
| 1910..... | 79,466 |
| 1911..... | 93,859 |
| 1912..... | 112,911 |
| 1913..... | 114,531 |
| 1914..... | 114,449 |
| 1915..... | 157,480 |
| 1916..... | 234,439 |

During the busiest period this season it has been necessary to exert all energies to prevent congestion of these terminals, and as prompt and economical operations depend upon the facilities at our disposal for taking care of all railway business, a comprehensive plan of additional railway facilities requires immediate consideration.

It is pleasing to record operations on such a large scale throughout the season without any serious delays and only a few inconsequential accidents.

ELECTRIFICATION OF HARBOUR RAILWAY TERMINALS.

As indicated in the Annual Report for 1915, the Commissioners have devoted much time and thought to the study of a scheme for the complete electrification of the Harbour Railway Terminals.

After inspecting up-to-date and successful installations, a survey of the resources of the Harbour and of the requirements was made and a complete design, with estimates, was obtained and discussed by experienced specialists.

It was ascertained that, in addition to the primary object of overcoming the smoke nuisance, the application of electricity would prove to be economical and flexible and especially advantageous for the elimination of the corrosion of steel and galvanized iron by acid gases.

Although preparations were made to urge forward the completion of this important work, the Commissioners decided that under existing conditions it would be advisable to postpone the expenditure for this undertaking until after the War.

MONTREAL WATER LEVEL COMMISSION.

The Board of Commissioners, appointed by Order-in-Council dated 12th June, 1915, composed of Mr. Eugene Haskell, Dean of the College of Civil Engineering, Cornell University; Mr. W. J. Stewart, Hydrographer, Department of the Naval Service; and Mr. Frederick Wm. Cowie, Chief Engineer, Harbour Commissioners of Montreal, continued throughout the year the investigations for making a comprehensive report upon the following questions relating to the navigation in the River St. Lawrence Ship Channel and Montreal Harbour, viz.:—

Effect of past dredging in the Ship Channel.

Effect of past dredging in St. Mary's Current.

Effect of all dredging in the St. Lawrence River on the water levels of the Harbour.

Probable effect of the dredging now being conducted south of St. Helen's Island.

Probable effect of other proposed dredging in Montreal Harbour.

Probable effect of any extension of the Guard Pier.

Probable effect of any increased diversion of water from the valley of the St. Lawrence and Great Lakes.

Probable effect of storage dams in the Ottawa River.

If deemed advisable, the Board may make suggestions to ameliorate trouble from ice.

Meetings were held in Montreal from time to time, the full Board being in attendance.

The question of water supply, diversion and regulation of flow, which must necessarily constitute one of the principal factors, being international, the value of the membership of Dean Haskell is most apparent.

Dean Haskell made a personal investigation of the

regulation and flow of the diversion of water from Lake Michigan through the Chicago Drainage Canal, and obtained valuable information.

Mr. A. J. Matheson, Engineer to the Commissioners, made a trip to the Upper Ottawa for the purpose of observing and reporting on conditions, regulation and progress of that important work.

The staff, under the Engineer, supervised by the Commissioners, continued the valuable research and observation work.

The problems which are of such immense importance are not easy of solution, and the Commissioners recognise that it is absolutely necessary to have complete information, so that the conclusions shall be without question and so that the very latest and most scientific methods may be used so as to set forth the necessary recommendations, as shall be feasible and financially justifiable.

WAR ROLL OF HONOUR.

Since the war was declared, the Commissioners have encouraged the enlistment of their staff by giving half pay to every officer and workman who enlisted for Overseas Service.

In addition to the following on active service many employees are also serving their country on home service.

| | |
|--------------------------------|---------------|
| Capt. J. J. Symons, R.N.R. | R. H. Dawes. |
| Sergt.-Major W. J. Porteous. | J. Waine. |
| P. F. C. Roberts. | T. J. Lilly. |
| Percy K. Seath. | D. Verveille. |
| Lieut. K. L. Duggan (wounded). | W. Waldorf. |
| G. O. Thom. | J. Milam. |

| | |
|----------------|-------------------|
| A. P. Sibley. | T. Stewart. |
| Geo. McCart. | H. Byers. |
| D. McGuirk. | J. Morrison. |
| E. Mockridge. | E. Bedard. |
| J. Querel. | T. Gariepy. |
| V. Flipping. | J. J. Sweeney. |
| R. Ponman. | P. J. Gilbert. |
| J. Fisher. | C. A. Smith. |
| Nap. Marion. | J. H. Philips. |
| P. Doyle. | G. McBride. |
| J. Furlong. | J. F. Fitzgerald. |
| A. Clark. | J. R. Johnson. |
| W. Draper. | E. White. |
| J. W. Sephton. | H. Lawlor. |

The above are still on active service overseas.

W. Chapman, killed in action, 1915.

P. Fitzpatrick, killed in action, 1916.

F. Sharples, returned to Montreal wounded, given employment.

J. Morrison, returned to Montreal wounded, given compensation.

F. Jones, returned to Montreal after completing service as Reservist.

In the matter of employment of workmen, the Commissioners have adopted the rule that, whenever possible, soldiers who return from the front will be engaged in preference to all others.

FINANCIAL STATEMENT.

The Statement of Receipts and Disbursements for the year 1916, hereto annexed, shows Receipts on Revenue Account of \$1,813,872.94, an increase of \$432,254.16 over the previous year, due principally to the large amount of grain handled by the Elevator System, and the consequent increase in the Railway Traffic on Harbour Tracks. During the year most of the grain arrived in cars, and much of it was shipped out in the same way after being bagged in the elevators.

The cost of operation, maintenance, interest, etc., was \$1,777,382.67, an increase over the previous year of \$307,471.69, leaving a balance to the credit of Revenue Account for the year of \$36,490.27. The interest charges, which amounted to \$878,357.57, show an increase of \$42,645.54, on new loans, due to the continued carrying out of works of improvement.

There was received from the Dominion Government on loan \$1,237,918.31, on account of Capital Expenditure on works of improvement.

The Disbursements on Capital Account were \$799,346.80, on the following works of Improvement:—

| | |
|--------------------------------|--------------|
| Wharves, Piers and Basins..... | \$271,011.57 |
| Grain Elevators..... | 224,300.92 |
| Harbour Dredging..... | 114,833.41 |
| Harbour Railway..... | 128,890.90 |
| Real Estate..... | 56,574.10 |
| New Plant..... | 3,466.07 |
| Permanent Sheds, etc..... | 269.83 |
| | <hr/> |
| | \$799,346.80 |

The Debenture Debt of the Corporation on the 31st December, 1916, was \$26,547,000.00, of which \$25,275,000.00 is due to the Government and \$1,272,000.00 to the public.

HARBOUR COMMISSIONERS OF MONTREAL.

Statement of Receipts and Disbursements for the Year ended 31st December, 1916.

| ITEMS | TOTALS | GRAND TOTALS | ITEMS | TOTALS | GRAND TOTALS |
|---|--------------|----------------|---|--------------|----------------|
| RECEIPTS ON REVENUE ACCOUNT. | | | | | |
| Grain Elevator System | \$633,781.48 | | DISBURSEMENTS ON REVENUE ACCOUNT | | |
| Railway Traffic Department | 375,089.27 | | Grain Elevator System, Operation and Maintenance | \$262,651.71 | |
| Wharfage Rates | 416,713.18 | | Railway Traffic, Operation, Maintenance, etc. | 274,498.12 | |
| Rental of Sheds, Hoists, etc. | 214,781.39 | | Harbour Equipment, Operation and Maintenance | 71,605.44 | |
| Rental of Harbour Spaces | 88,969.40 | | (The above do not cover Interest, Depreciation, Administration, etc.) | | |
| Sundry Receipts on Revenue Account | 84,538.22 | | Miscellaneous and General Expenses | 111,539.61 | |
| | | | Police Service on Wharves | 26,590.97 | |
| | | | War Service Allowance and Patriotic Fund | 14,209.41 | |
| | | | Sundry Disbursements on Revenue Account | 90,929.84 | |
| | | | Reserve Account, for Depreciation, etc. | 47,000.00 | |
| Total Receipts on Revenue Account.. | | \$1,813,872.94 | Total Operation, Maintenance, etc. | 899,025.10 | |
| | | | Interest on Debentures and Loans | 878,357.57 | |
| | | | Total Disbursements on Revenue Account | | \$1,777,382.67 |
| RECEIPTS ON CAPITAL ACCOUNT | | | | | |
| Dominion Government Advances under Act 4-5, George V, Cap. 41. | | | DISBURSEMENTS ON CAPITAL ACCOUNT | | |
| Security Deposits Received from Contractors.. | | | High Level Wharves, Sections 25 to 30 | \$114,899.77 | |
| Grand Total Receipts | | 1,237,918.31 | Bickerdike Pier, New Approach South | 61,333.90 | |
| | | 7,504.21 | Victoria Pier and Market Basin Wharves | 46,030.96 | |
| | | 3,059,295.46 | Pointe aux Trembles Wharf, Sec. 100 and 101 | 19,794.75 | |
| Outstanding Accounts and Accrued Interest as at 31st December, 1916 | 720,037.83 | | Montreal East Wharf, Sections 109 and 110 | 14,198.82 | |
| Less: | | | Paving Wharves and Piers | 6,195.31 | |
| Outstanding Accounts and Interest 1915 | 600,706.08 | | Water Pipes and Drains | 2,880.95 | |
| | | | Windmill Point Embankment | 2,565.74 | |
| | | | Jacques Cartier Pier Widening | 2,069.58 | |
| | | | Harbour Boundaries | 960.00 | |
| | | | Floating Dock Site | 81.79 | |
| Balance of Outstanding to add | | 119,331.75 | Wharves, Piers and Basins, Total | 271,011.57 | |
| | | 3,178,627.21 | Grain Elevator No. 1, West Extension | 223,955.78 | |
| | | | Grain Elevator No. 2, Construction | 345.14 | |
| Loans from Bank of Montreal as at 31st December, 1915 | | 339,591.16 | Grain Elevators, Total | 224,300.92 | |
| | | | Channel South of St. Helens Island | 114,446.68 | |
| | | | Altering Guard Pier | 371.25 | |
| | | | Moffats Island Removal, Balance | 15.48 | |
| | | | Harbour Dredging, Total | 114,833.41 | |
| | | | Harbour Railway Tracks and Sidings | 128,890.90 | |
| | | | Real Estate, Hochelaga and Mill Street | 56,574.10 | |
| | | | Plant Account, Flat Scows | 3,466.07 | |
| | | | Permanent Sheds 24 and 25 | 147.62 | |
| | | | Electric Circuit | 122.21 | |
| | | | Total Disbursements on Capital Account | | 799,346.80 |
| | | | Security Deposits returned to Contractors | | 8,289.26 |
| | | | Grand Total Disbursements | | 2,585,018.73 |
| | | | Balance at 31st December, 1916:— | | |
| | | | Bank of Montreal | 226,019.46 | |
| | | | Cash on Hand | 4,700.00 | |
| | | | Accounts Receivable | 320,966.91 | |
| | | | Materials in Stock at 31st December, 1916 | 343,541.78 | |
| | | | Total Balance at 31st December, 1916 | 895,228.15 | |
| | | | Less: | | |
| | | | Balance at December 31st, 1915 | 641,210.83 | |
| | | | Difference in Balance, to add | | |
| | | | | | 254,017.32 |
| | | | | | \$2,839,036.05 |

Certified:

GEORGE E. SMART, Comptroller.

Verified:

RIDDELL, STEAD, GRAHAM & HUTCHISON, C.A., Auditors.

Certified:

DAVID SEATH, Secretary Treasurer.



PORT AUTHORITIES CONVENTION.

The Convention of the American Association of Port Authorities took place in Montreal, September 13th to 15th, the meetings being held in the Board Room of the Harbour Commissioners' Office.

The following is a programme of the proceedings:—

PROGRAMME

Fifth Annual Convention
of the

American Association of Port Authorities
Montreal, Canada.

September 13, 14, 15, 1916.

Harbour Commissioners' Office.

First Day, Wednesday, September 13th.

MORNING SESSION, 10 A.M.

Address of welcome by the City of Montreal.

Address of W. G. Ross, President, Montreal Harbour
Commissioners.

Response on behalf of the Association.

Official Reports.

Nomination of Committees.

Inspection of the Harbour water front.

Buffet luncheon on steamer.

AFTERNOON SESSION, 2.30 P.M.

Paper:—W. G. Ross, "Port Organization and Administration."

Paper:—Thos. S. Williams, Harbour Commissioner, San Francisco, "Concrete Wharf Supports in San Francisco Harbour."

Paper:—Sir John Kennedy, M.Inst.C.E., Consulting Engineer, Harbour Commissioners of Montreal, "St. Lawrence River and Canals of Canada."

Paper:—E. C. Porter, Washington, "Establishment of Uniform Harbour Dues."

Second Day, Thursday, September 14th.

MORNING SESSION, 10 A.M.

Paper:—Hon. F. W. Mulkey, Portland, Oregon, "Legal Jurisdiction over Stream Beds and Shores and Navigable Waters, etc."

Paper:—Hon. E. N. Loeb, President, Board of Commissioners, Port of New Orleans, "Glossary and Interpretation of Port Terms."

Paper:—Robert Bridges, President, Seattle Port Commission, "Rail and Water Terminal Facilities."

AFTERNOON SESSION, 2.30 P.M.

Paper:—F. W. Cowie, M.Inst.C.E., Chief Engineer, Harbour Commissioners of Montreal, "Canadian Ports."

Paper:—O. F. Lackey, Baltimore, Md., "The Establishment of a Maximum Channel Depth in Relation to Expenditure for Harbour dues, etc."

7.30 P.M.

Banquet by Harbour Commissioners of Montreal at St. James's Club.

Third Day, Friday, September 15th.

MORNING SESSION, 10 A.M.

Paper:—Hon. John Meigs, President, Department of Wharves and Ferries, Philadelphia, "The Granting of Free Wharfage by Private Corporations, etc."

Paper:—A. D. Swan, M.Inst.C.E., Consulting Engineer, Montreal, "Some Ports on the West Coast of South America, and their Future Development."

Paper:—Edward F. McSweeney, Boston, "Question of Switching Charges and the General Relations of Railroads at Each Port."

General Business.

Report of Committee on Resolutions.

Election of Officers.

Luncheon by Shipping Federation of Canada.

AFTERNOON SESSION, 2.30 P.M.

Inspection of Railway Terminals, Elevators, Transit Sheds and Port Facilities in Montreal Harbour.

The following among others were present at the Meetings of this Convention:—

Messrs. W. Sanford Evans, Ottawa; Dr. R. Magill, Fort William; James V. Russell, St. John, N.B.; H. K. McCay, Baltimore; John Meigs, Philadelphia; D. O. Lesperance, Quebec; Calvin Tomkins, New York; W. Joshua Barney, New York; H. B. Walker, Montreal;

J. Spencer Smith, New York; H. E. Waterman, Hamilton; A. Guy Ross, Montreal; Thos. Williams, San Francisco; Robert Bridges, Seattle; Norman L. Stamm, Philadelphia; Benjamin Thompson, Florida; Hon. John N. Cole, Edward McSweeney, and R. E. Barrett, Boston; James A. Fullerton, Vancouver; R. R. Knight, Fort William; D. H. Pennington, Quebec; Harry C. Gahn, Cleveland; W. G. Ross, Farquhar Robertson, Brig.-Gen. A. E. Labelle, F. W. Cowie, Major David Seath, M. P. Fennell, Jr., James Spelman, Harold Rolph, T. W. Harvie, Capt. T. Bourassa, Sir John Kennedy, A. D. Swan, S. P. Brown and Howard G. Kelley.

THE DOMINIONS ROYAL COMMISSION.

The Dominions Royal Commission held sittings in Montreal, commencing October 27th, in order to take evidence upon the natural resources of Canada, and upon the development of such resources, with a view to suggesting methods by which trade may be improved and extended. The Harbour Commissioners, deeply interested in this question so vital to the future of Canada and of Montreal Harbour, prepared a statement giving the salient features regarding the development of the Harbour up to the present, its facilities for business and outlook for the future.

The following is a list of the Members of the Dominions Royal Commission who attended the meetings:—

Sir Alfred Bateman, K.C.M.G., Chairman.

Sir Jan Langerman.

Mr. Wm. Lorimer.

Mr. Jos. Tatlow.

Mr. J. R. Sinclair.

Mr. Tom Garnett.

Hon. Sir Geo. E. Foster, K.C., Minister, Trade and Commerce, Canada.

Mr. E. J. Harding, Secretary.

Mr. Albert E. Mitchell, Private Secretary to Sir Alfred Bateman.

At the suggestion of the Harbour Commissioners, the Dominions Royal Commission made an inspection of the Port, so that a general comprehensive view of its facilities could be seen, and after inspection of the Harbour, a Meeting to take formal evidence regarding the Harbour of Montreal was held in the Board Room of the Harbour Commissioners' Office, where there was on view a large plan of the Harbour and a large transportation map of Canada, as well as photographs, drawings and other material designed to aid in the consideration of the problems of the Port.

ENGINEERING DEPARTMENT.

The Engineering Department of the Harbour Commissioners of Montreal is organized so as to have charge of varied and important branches, as follows:—

Harbour Construction, Maintenance and Operation.

The construction work, excepting buildings, is almost universally carried on departmentally. The steady growth of the Harbour and the constant yearly effort to keep pace with the commerce has resulted in the Commissioners having a splendid plant for the peculiar construction required. Dredging plant, tugs, derricks and a shop for repairs, are all kept up-to-date, and the organization for construction is capable of dredging and placing in the works some two or three million cubic yards of excavated materials; of building half a mile of cribwork and concrete quay walls of a height from the foundations to the

cope of 60 feet; of building fifty thousand cubic yards of concrete, constructing railways, walls, sheds, culverts and, in fact, almost every phase of port construction.

HARBOUR CONSTRUCTION.

The following are the chief items of construction for the season:—

The improvement and extension of Harbour Railway Terminals.

The continuation of the construction of new Victoria Pier and Market basin.

The continuation of the construction of bulkhead High Level wharves on the river front, eastwards from Victoria Pier.

General dredging for widening and deepening of basins and berths.

Dredging of channels for the amelioration of St. Mary's Current.

Paving and laying railway tracks on wharves.

The continuation to completion of improvements resulting in the Floating Dock Basin and site for the Canadian Vickers' ship-building and repair yard.

The construction and improvement of harbour facilities, such as hoists, flood gates, bridges, subways and freight yards.

Additions and improvement to Harbour Commissioners' construction plant.

The completion of a second industrial wharf at Pointe-aux-Trembles.

The construction of a Market Wharf for Montreal East.

The completion of the construction of the West Extension to Grain Elevator No. 1.

The acquisition of operating and railway plant.

Erection of a new office; additional chutes for bagging and new standpipe at Elevator No. 1.

Erection of new offices in Shed No. 7 for the better accommodation of the lessees.

Erection of coal bin, storage tank and sand dryer at Locomotive shops.

Installation of an additional quick acting flood gate near the end of King Edward Pier.

The maintenance of berths and channels, of wharves, sheds, buildings, roadways, water service, cleaning of wharves and general repairs were carried on as usual.

The operating of harbour facilities such as plant for the storage and handling of grain, electric lighting and power services.

Operating the floating crane, electric hoists and the construction and maintenance of industrial connections with the Harbour were all carried on during the season with an even greater measure of success than usual.

Extension of High Level Railway Embankment. Vulcan Wharf to Pointe-aux-Trembles.

From the Vulcan Wharf, just above Longue Pointe, the earthwork embankment was advanced eastward for a distance of about one and one-fifth miles. Of this portion the double tracks were laid for a distance of about 1,200 ft., a further length of about half a mile being completed and graded ready for the permanent way.

The embankment was strongly protected on its outer face with rock rip-rap, the rock being obtained from excavation and dredging for the Bickerdike Pier Extension. The main portion of the embankment was made from material obtained from dredging in the vicinity.

Reinforced concrete culverts 36" diameter were constructed at all points where surface drains existed.

At Longue Pointe, where two small wharves existed and where the water is very deep close to the shore, heavy work was encountered. In addition to this, access to the two local wharves was a matter for serious consideration; the traffic to these wharves is not extensive and the wharves were of the old-fashioned wooden type. As the future of the Harbour in this locality has not yet been developed, it was decided to construct a temporary wooden subway to connect with the old wooden wharf opposite the Hôpital St. Jean de Dieu. This subway, having a 16 ft. span and 10 ft. 6 in. headroom, was constructed substantially of timber and will give convenient access to the low level wharf.

Before extending the High Level Railway Embankment over this wharf, Les Sœurs de Charité de la Providence requested the Harbour Commissioners to rebuild at their cost their intake system, which has for many years existed through the old wharf. This work consisted of excavating and laying of pipes and the construction of a wall. The work was commenced rather late in the Autumn and proved to be rather tedious on account of quicksand. Before the close of the season this work was, however, satisfactorily completed.

Most of the embankment in deep water in the vicinity of Longue Pointe was completed and it is expected that next year this work will be completed down to the Pointeaux-Trembles cement wharf and if possible to the Imperial Oil Wharf completed in 1916.

The cutting out of the night work of the Dredging Fleet reduced the quantity of material by one-half and progress therefore for 1916 was not as great as expected.

New Railway Yard at Longue Pointe.

At the Vulcan Wharf, a new railway yard, about 1,400 ft. in length and 4 tracks wide, was constructed in 1916. Three of the sidings were electrified by the Montreal Tramways Co. for the purpose of interchanging cars between the Harbour Commissioners' terminals and their own system connecting with industrial establishments.

Railway Embankment Racine Pier to Vulcan Wharf.

The new embankment constructed in 1915 was resurfaced and the double track laid for a distance of about one mile. Wherever necessary, further rip-rap was done and all work put in good order.

New Railway Yard Opposite Dry Dock Site.

The railway yard opposite the Dry Dock Site was completely re-built and re-organized in 1916. The ground was all raised about 4 ft. to bring it to the final elevation and tracks were laid in their final position. Two main tracks, each about 3,000 ft. long, were added to this yard, which now consists of a yard having from 3 to 6 tracks with a teaming track on the city side and a much improved junction with the Canadian Northern Quebec Railway.

Railway Yard at Moreau Street.

The firm of Turner Bros. of Manchester, England, having erected a warehouse on property leased from the Harbour Commissioners, a siding was constructed by the Commissioners to take care of the business of this company. At the same time a railway yard was laid out and constructed at Moreau Street for the accommodation of the industries at that point, and provision was made for teaming by laying down two sidings adjoining Notre Dame Street.

Various Sidings.

As the new Victoria Pier approached completion, the tracks thereon were from time to time extended and when the extension to Elevator No. 1 was completed, a new siding was laid there.

A new teaming track was provided at Section 12 and the gradual replacing of No. 7 by No. 9 crossovers was continued at various points on the main lines.

On requisition of the various companies adjoining the Harbour, new railway connections were made, among others:—To the Peck Rolling Mills at Windmill Point; to the sand bins at Section 43 and at the Cement Wharf at Pointe-aux-Trembles.

SUMMARY OF RAILWAY CONSTRUCTION WORK.

Earthwork.

| | |
|--------------------------------------|---------------------------|
| Racine Pier to Pointe-aux-Trembles.. | 285,500 cu.yds. |
| Sidings at Dry Dock..... | 12,000 |
| Total embankment..... | 297,500 cu.yds. (In situ) |

New Tracks.

| | |
|-------------------------------------|----------------------------|
| Vulcan to Longue Pointe..... | 2,072 lin.ft. |
| Vulcan (electrified)..... | 2,700 |
| Racine to Vulcan (doubling)..... | 5,324 |
| Sidings at Dry Dock..... | 6,452 |
| Moreau Street..... | 1,657 |
| Victoria Pier..... | 1,410 |
| Elevator No. 1..... | 200 |
| Section 12 (teaming tracks)..... | 420 |
| Peck Rolling Mills..... | 80 |
| Poupore sand bins..... | 254 |
| Canada Cement (Pointe-aux-Trembles) | 486 |
| Total new tracks..... | 21,055 lin.ft. or 4 miles. |

Alterations, etc.

| | |
|---------------------------------------|----------------------------|
| Racine to Vulcan, raising and slewing | 2,200 lin.ft. |
| Sidings at Dry Dock, “ | 6,850 |
| Renewal of track, Sections 41 to 46.. | 1,140 |
| Total alteration..... | 10,190 lin.ft. or 2 miles. |
| Total track work..... | 6 miles. |

Continuation and Construction of New Victoria Pier and Market Basin.

In the scheme of Harbour Extensions commenced in 1910, every consideration was given not only to the enlargement of steamship accommodation, but also to give additional and convenient accommodation to the important fleet of river and ferry steamers.

It was recognised that the river steamers, which do a tremendous passenger and market traffic, should have a location in the Harbour convenient to the centre of the city and to the Bonsecours Market.

Such excellent progress was made during the early part of the season that on September 27th, the quay walls and retaining walls being completed, the new Victoria Pier was inaugurated. A bronze tablet recording the completion of this work was bolted to the concrete wall, reading as follows:—

VICTORIA PIER

Inaugurated September 1916, by
HIS ROYAL HIGHNESS THE DUKE OF CONNAUGHT AND
STRATHEARN, K.G.,
Governor-General of Canada,
the illustrious son of
HER MAJESTY QUEEN VICTORIA
to perpetuate her name and glorious reign
the pier which this one replaces was named Victoria.

Harbour Commissioners of Montreal

WILLIAM G. ROSS, President.

| | |
|---------------------------|---------------------------|
| FARQUHAR ROBERTSON, Esq., | Brig. Gen. A. E. LABELLE, |
| F. W. COWIE, M.Inst.C.E., | Major DAVID SEATH, |
| Chief Engineer. | Secretary-Treasurer. |



Inauguration of Victoria Pier by H.R.H. the Duke of Connaught and Strathearn,
Governor-General of Canada, September 27th, 1916

INAUGURATION OF VICTORIA PIER.

In the presence of a large concourse of citizens, many of them distinguished in the political and civic life of the Dominion, His Royal Highness the Duke of Connaught, Governor-General of Canada, unveiled the bronze tablet and officially declared the pier open and complete.

Description of Victoria Pier.

Length parallel to Jacques Cartier Pier (high level),
843 ft.

Depth of water, 29 to 30 ft.

Cribs sunk to 36 ft.

Length of outer face (high level), 1,150 ft.

Depth of water, 30 ft.

Cribs sunk to 38 ft.

Length of downstream end (low level), 255 ft.

Depth of water, 30 ft.

Cribs sunk to 37 ft.

Length inside (low level) in two straight portions, 1,041 ft.

Inside low level, parallel to Jacques Cartier Pier, 450 ft.

Depth of water, 25 to 26 ft.

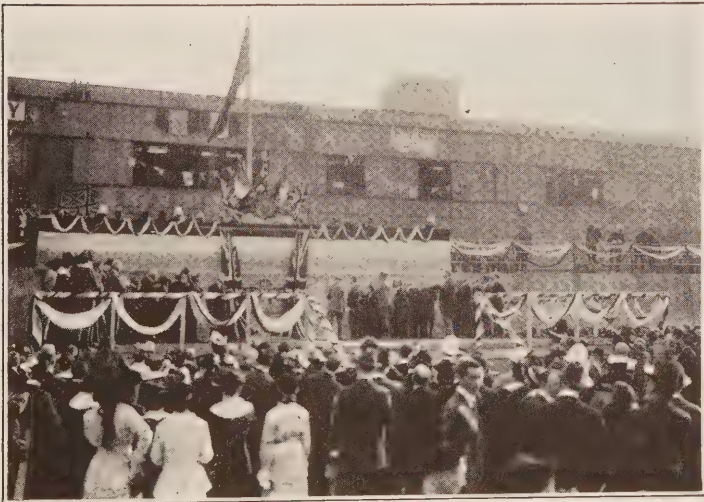
Width, 120 ft.

Area high level, 329,243 sq. ft.

Area low level, 138,225 sq. ft.

The remaining short length of 145 ft. of high level quay left incomplete last year was finished, as also were the four last slipways on the low level quay which were not quite completed last year.

The construction of the retaining wall dividing high and low level was then resumed and finished to completion by the end of September. The length of wall actually constructed was about 1,100 ft., a second ramp con-



Inauguration of Victoria Pier by H.R.H. the Duke of Connaught and Strathearn, Governor-General of Canada, September 27th, 1916

necting high and low level was provided for and a stairway and ladder were constructed at the lower end. The low level quay at the outer end of the pier for an extent of about 2,000 sq. yds. was paved with scoria blocks and a concrete sidewalk formed alongside. Good progress was made with the earth filling in the heart of the pier, the material being obtained from city contractors, and it is anticipated that dumping during the Winter will complete it.

Quantities of Principal Units.

| | |
|----------------------|----------------|
| Mass concrete..... | 4,200 cu. yds. |
| Paving..... | 2,500 sq. yds. |
| Drains..... | 550 lin. ft. |
| Excavation..... | 1,400 cu. yds. |
| Filling (carts)..... | 86,000 “ |

High Level Shore Wharves, Sections 25 to 30.

A further extension of 560 lin. ft. was made during the year. Four standard cribs, 140 ft. long, each, were sunk, filled and the concrete superstructure begun. It was intended to bring the quay to standard low level, but shortage of labour prevented its completion, the average elevation of the work as it stands being about 5 ft. above low water level.

The work this year passed in front of the existing Craig Street and Delorimier Avenue sewer outlets, and openings 7 ft. sq. and 10 ft. sq., respectively, were formed in the cribwork for the extension of the sewers through the new work. A well was also provided for the future installation of a water gauge.

When the structural work was completed, sufficient back-fill was put in by Harbour Commissioners' derricks

to ensure the safety of the work during Winter and Spring.

The construction of these wharves has now reached a point 1,040 ft. below the Ogdensburg Wharf.

The re-filling behind the portion of wall built last year was also proceeded with by carts from city contractors.

Quantities of Principal Units.

| | |
|-----------------------|-----------------|
| Cribwork..... | 488,000 cu. ft. |
| Concrete..... | 2,400 cu. yds. |
| Filling by carts..... | 23,000 " |

Wharf for Queen City Oil Co. at Pointe-aux-Trembles.

This wharf, begun last year, required about 40,000 cu. yds. of refilling and about 13,000 sq. yds. of grading to complete. The work was finished in July and the first steamer, the S.S. "Imperoyal," discharged a cargo of oil on Saturday, 29th July. The approach to the dock was greatly improved by dredging during the season. When



Canada Cement Co.'s Pointe aux Trembles Wharf. Coal-handling plant.

the wharf was completed, the company requested the Harbour Commissioners to construct for them intake wells at the lower end of the wharf and also to excavate a trench for the intake and sewer pipes across the wharf. This work was undertaken, and although difficult and tedious, was satisfactorily completed on December 2nd, the quantities being:—

Excavation..... 3,600 cu. yds.

Timber used..... 71,520 ft. B.M.

The new berthage is 250 lin. ft.

Market Wharf for Montreal East.

The construction of a new market wharf for the convenience of the district of Montreal East was begun on October 7th. The wharf is of standard construction, cribwork substructure and concrete superstructure, provides a berthage of 100 ft. in length with draught at E.L.W. of 12 ft., the cribwork being sunk 2 ft. deeper. A slipway of 18 ft. in width, easy grade, is provided and an ice slope of the latest type is constructed at upper end. The main sewer which discharges at the upper end of the wharf was protected by a line of sheet piling during operations. The work, with exception of anchor blocks and back portion of slipway, neither of which can be done until the City completes the re-filling, was completed by November 29th and rock filling was then deposited to protect the work during Winter.

This wharf was built to the order of the Municipality of the Town of Montreal East.

Principal Units.

Cribwork..... 53,000 cu. ft.

Concrete..... 650 cu. yds.

Piling..... 1,250 lin. ft.

SUMMARY

| | |
|---|----------------|
| Cribs sunk: Shore wharves (four)..... | 560 lin. ft. |
| Montreal East (one)..... | 186 " |
| Total..... | 746 lin. ft. |
| Quay walls built to H.L.:— | |
| Victoria Pier..... | 145 lin. ft. |
| Quay walls built to L.L.:— | |
| Market Basin (completed)..... | 500 " |
| Shore wharves (partially)..... | 560 " |
| Queen City Oil (completed)..... | 250 " |
| Montreal East (partially)..... | 100 " |
| Total quay walls completed or partially built..... | 1,555 lin. ft. |
| Retaining walls: Victoria Pier..... | 1,100 " |
| Total quay and retaining walls..... | 2,655 lin. ft. |

Dredging and Filling in General.

The dredging fleet, working only 10 hours per day, completed a full and successful season's work.

Dredge No. 6 was rented to Messrs. M. P. & J. T. Davis, Contractors, of Lauzon, Quebec, leaving on 23rd September and returning 29th November.

Fortunately no serious wrecking or salvage work was required, the only incident of the kind being the grounding of S.S. "Jason" on the North side of the Ship Channel in the vicinity of the Dry Dock, on November 21st, and Harbour Commissioners' dredges Nos. 4 and 5 pulled her off on November 23rd.

Derrick No. 8 was engaged from November 30th to December 9th dredging sewage from Elgin Basin Sewer, the amount removed being 7,400 cu. yds.

Channel behind St. Helen's Island.

Two dredges were engaged all season at the head of the cut and a third for part of the season was engaged straightening the South side on the lower stretches. At the upper end, last year's work for a length of about 700 ft. was widened by about 200 ft. and the head of the cut advanced about 300 ft., the actual area covered being nearly 5 acres, while the widening of the lower stretches amounted to 3 acres, in all nearly 8 acres were added and the quantity dredged 305,500 cu. yds. The material obtained was gravel, boulders and rock and was used at the new wharves at Section 29 and Pointe-aux-Trembles and in the railway embankment.

Bickerdike Pier Extension.

One dredge was engaged all season, widening last year's work 40 ft. for a length of 630 ft. and extending the channel full width of 170 ft. for a distance of 370 ft. The actual area covered and dredged to 30 ft. L.W. was 2.19 acres and the amount removed was 190,196 cu. yds. The material, solid shale rock, was used for crib filling and protection at Section 29 and Montreal East and for rip-rap on railway embankment.

Approach to Queen City Oil Wharf.

An area of nearly 5 acres was covered and cleared to a depth of 26 ft. L.W., the quantity dredged being 13,100 cu. yds.

Cribseats.

The quantity of dredging on cribseats at Section 29 and Montreal East amounted to 12,900 cu. yds.

Marine and Fisheries Department Dredges.

Dredge No. 1 was engaged from May 9th to November 4th widening the Ship Channel southward, opposite Sections 29 to 33, the amount accomplished being 1,500 ft. long by about 250 ft. wide, depth 32 ft. at L.W. and the actual area being 10.77 acres and the quantity 69,500 cu. yds. The material, mainly large boulders, was dumped to form the toe of the railway bank.

Dredge No. 10 was engaged from June 21st to November 15th off Tetraultville, and supplied much excellent gravel, which was used for railway ballast. The total area covered was 5.39 acres and the quantity dredged was 243,050 cu. yds.

Dredge No. 11, between May 26th and November 14th, widened the Ship Channel to an extent of from 100 ft. to 250 ft., for a distance of nearly one mile from Sutherland Pier to the Dry Dock. The actual area was 11.75 acres and the quantity 249,600 cu. yds. The material went largely to railway embankment.

SUMMARY.

By Harbour Commissioners' Dredges:—

| | Acres | Quantity |
|--------------------------------|-------|-----------------|
| South channel..... | 8.00 | 305,500 cu.yds. |
| Bickerdike Pier Extension. . . | 2.19 | 190,196 |
| Queen City Wharf..... | 5.00 | 13,100 |
| Cribseats..... | 1.26 | 12,900 |
| Maintenance..... | 2.00 | 4,650 |
| Sewage..... | .16 | 7,400 |
| Total..... | 18.61 | 533,746 cu.yds. |

Marine and Fisheries Dredges:—

| | | | |
|------------------|--------------|-------------------|---------|
| No. 1..... | 10.77 | 69,500 | |
| No. 10..... | 5.39 | 243,050 | |
| No. 11..... | 11.75 | 249,600 | 562,150 |
| Grand Total..... | 46.52 acres. | 1,095,896 cu.yds. | |

GENERAL RECAPITULATION OF HARBOUR CONSTRUCTION, 1916.

Railways.

| | |
|----------------------|-----------------|
| New tracks..... | 4 miles. |
| Alterations..... | 2 miles. |
| Total trackwork..... | <u>6 miles.</u> |

Quay and Retaining Walls, etc.

| | |
|--|----------------------|
| Cribwork built and sunk..... | 746 lin.ft. |
| Quay walls completed to H.L..... | 145 lin.ft. |
| Quay completed or in progress to L.L..... | <u>1,410</u> |
| Total quay walls, complete or in progress..... | 1,555 lin.ft. |
| Retaining walls..... | <u>1,100</u> |
| Total quay and retaining walls..... | <u>2,655 lin.ft.</u> |

Dredging and Filling.

| | | |
|-------------------------------|--------------|--------------------------|
| Dredging: H.C.M. dredges..... | 18.61 acres | 533,746 cu.yds. |
| M. & F. dredges..... | <u>27.91</u> | <u>562,150</u> |
| Total..... | 46.52 acres | 1,095,896 cu.yds. |
| Filling: By derricks..... | | 600,087 cu.yds. |
| By dump scows..... | | 503,725 |
| By city contractors..... | | <u>115,157</u> |
| Total..... | | <u>1,218,969 cu.yds.</u> |

MAINTENANCE.

Wharves.

The gradual replacing of the old wooden wharves by concrete quay walls is appreciably reducing the amount of maintenance necessary annually, and last Spring the ice dealt gently with the wharves in general so that maintenance for the year was light. The chief items were:—

(a) Renewing of ties and planking in front of Sheds Nos. 7 and 9.

(b) Strengthening by means of sheet piling the wharf at Section 30, which had become undermined and showed signs of collapse to the great danger of the High Level Railway embankment.

(c) Repairs to wharf at Section 40, damaged by ice.

(d) The renewal of a portion of the lower side of Laurier Pier, occasioned by ordinary wear and tear.

(e) The replacing of mooring posts, fenders, etc., principally at ferry landings on both sides of river.

(f) Repairing damage caused by collision of S.S. "Waccamaw" with wharf at Section 42, on November 19th.

Dredging and Sweeping.

The usual tests of the Ship Channel were made but no obstacles were found; the sweeping of Windmill Point Basin revealed considerable deposit, partly occasioned by the break in the Canal Raceway, which was promptly dredged away. The deposit from the Elgin Basin Sewer was as usual dredged out at the expense of the City.

Roads, etc.

The scavenging, watering and upkeep of paved, Tarvia, Rocmac, asphalted and ordinary macadamized roadways required the constant vigilance of about 35 men, who succeeded in keeping the wharf surface in very creditable condition.

Life Saving Equipment.

Every precaution was taken to facilitate the saving of life and the prevention of accident by the erection of railings and the distribution of ropes, gaffs, and life preservers at 169 different points along the wharf front.

Drains and Water Service.

All drains, manholes, etc., were kept clear and well flushed. A new water connection was obtained from the City main at Papineau Avenue, while 32 hydrants and 15 latrines were kept in good order during the season.

A considerable part of this department's work during the season was supplying ships with water, no fewer than 111 large steamers having been supplied with an aggregate of 617,200 cubic feet.

Sheds and Elevators.

In Sheds Nos. 2, 4 and 7, a total of 114 of the old metal-covered wooden doors were replaced by all-metal doors of modern type, while the gutters and downspouts on both sides of Sheds Nos. 3, 5 and 6 were replaced by ones of much improved design. In Shed No. 16 a floor subsidence was made good and in Shed No. 24 new steel-work was put in to replace 20 damaged beams in the upper floor, the slab being then put in good condition.

Painting was done in the interiors of Sheds Nos. 2, 4 and 6, and the exteriors of Sheds Nos. 4, 6, 7, 8, 9, 10, 11, 12 and 14; electric hoists, conveyor galleries over Sheds Nos. 2, 4, 11, 12, 13, 14 and 15, and conveyor to Elevator No. 2 all received one coat of paint.

The steel bins of old Elevator No. 1 were reinforced by the addition of 550 steel rods securely bolted inside, many worn out plates were renewed and about 40 goose-necks were replaced. In addition to these main items, multitudinous minor repairs were attended to and all structures were maintained in good order.

Railways.

Owing to the steady increase of mileage and in volume and weight of traffic, railway maintenance is becoming a greater and more important item every year. At present about 42 miles of track, mostly yard, has to be maintained and a maintenance gang and section men are employed from one year's end to the other repairing slip diamonds, renewing ties, rails, switches, etc., and sur-

facing in general. During the past year about 3,500 ties were renewed and over 1,000 lin. yds. of rail replaced, and it speaks well for the organization that in spite of the rush and congestion of the past year, nothing more than a few very ordinary mishaps of a trifling nature occurred.

Raceways.

The canal and power raceways at Windmill Point Basin have caused much anxiety for several years, but this year has been unusually disastrous and three serious breaks have occurred.

On 15th July the canal sluiceways adjoining Ogilvie's Flour Mill gave way and the canal burst through the raceway, more or less wrecking the wharf at the head of the Windmill Point Basin, and causing large deposits in the basin itself, which had to be dredged out. Remedial work is still in progress and the raceway still out of commission.

On 21st July, the raceway passing underneath Ogilvie's warehouse gave way close to the Harbour Boundary. The intermediate supports gave way and the roof collapsed for a length of about 34 ft., the major portion of which, viz. 28 ft., being on the Ogilvie property and the remaining 6 ft. on Harbour property. The floor and side walls were found to be intact, so the original intermediate supports of posts and stringers were replaced by stout crib walls and a new double timber roof laid thereon. One of Ogilvie's sidings and one of the Harbour Commissioners' tracks were undermined and put out of commission, necessitating a temporary connection being laid to Peck Rolling Mills. The remedial work was carried out by the Harbour Commissioners and was

completed on 29th August, the cost being proportionately allocated between the Harbour Commissioners and the Ogilvie Co.

On November 11th a portion of the Canal Raceway at Black's Bridge collapsed, causing a serious subsidence alongside and under the tracks leading to the Grand Trunk Elevator, rendering the westmost track unsafe and endangering power lines and wharf traffic. The Grand Trunk Railway provided for their traffic by driving piles clear of the raceway at both sides and carrying the damaged track over the subsidence on a pair of steel girders each 55 ft. long. The Montreal Light, Heat and Power Co. secured their power lines, and the Harbour Commissioners barricaded and policed the area of subsidence for public safety. No reconstruction work has yet been attempted.

Harbour Lighting and Power.

During the season, 159 series arc lamps were in service at the various sections of the Harbour, which were maintained by the Montreal Light, Heat and Power Co. At Sections 15, and 18 and 25, 61 of our own flame arcs and 2,100 C.P. nitrogen lamps were in service.

The electrical equipment of the Head Office, Dredging Plant, Transit Sheds, Grain Elevators, Freight Hoists, Car Handling Winch, Escalator, Engine Shops and Sub-Stations was maintained and improved, the operating staff carrying on the service without delays or accidents.

General.

The usual force of watchmen was employed to protect the property of the Commissioners, to guard the public from accident and to regulate the Harbour dumping ground.

The break-up last Spring was almost phenomenal for the fact that practically no ice was left on the wharves and no expense was necessary to clear them, while damage by ice-shove or flood was insignificant.

OPERATION.

COMPLETION AND OPENING OF WEST EXTENSION, ELEVATOR No. 1.

The original Elevator No. 1 was completed in 1904, its capacity being 1,000,000 bushels. In 1913 an addition was constructed, having a capacity of 1,500,000 bushels. Additional storage space being immediately required, the construction of the West Extension to Elevator No. 1 was commenced in 1915, being designed for an additional capacity of 1,500,000 bushels.

As predicted in last year's report, the West Extension to Elevator No. 1 was ready for operation in May 1916.

On May 15th Sir Robert Borden, Prime Minister of Canada, accompanied by Lady Borden, officially opened the West Extension to Elevator No. 1, in the presence of about 2,000 guests.

Sir Robert Borden, speaking at one of the sheds on the Harbour, said that the development of Canada's great ports was part of the great scheme of transportation affecting the future of Canada in a great degree, and of which the highways, canals and railways also formed part. He said that in connection with the opening of this huge grain elevator they were in touch with the great agricultural industry of Canada, an industry upon which all others depended. In the western provinces we had only begun to scratch the surface of the ground. The great question in Canada was transportation, the way to get this produce

to the markets of the world. In the manner of development of the Canadian Harbours, the Prime Minister said that the Harbour Commission would have every assistance from the Dominion Government.

Mr. W. G. Ross, Chairman of the Harbour Commissioners, said that the elevator, with its capacity of 4,000,000 bushels, making it the largest seaport elevator in the world, had been made possible by the generous financial assistance of the Dominion Government. The extension had been completed two months ahead of time, at a cost of 10 per cent. under the estimated cost of \$800,000. The elevator can unload, the chairman said, the largest lake steamer three and one-half hours after its arrival and can fill the largest grain carrier in seven hours. Montreal, he said, had handled in 1914 more grain than was handled at any other seaport of North America.



Occasion of inauguration of extensions to Elevator No. 1 by Sir R. L. Borden
May 15th, 1916

Harbour Commissioners' Grain Elevator System.

The Harbour Commissioners' Elevator System, which includes elevators, conveyor facilities, etc., which commenced in 1904 with an elevator having a capacity of 1,000,000 bushels, reached in May, 1916, two large elevators having a combined capacity of 6,662,000 bushels.

The operation of the elevators during the season was marked by two important features, viz., the change of the bulk of grain receipts from marine to car delivery and the extensive bagging operations for shipping of oats in bags. Where in 1914 only 13% of the grain received at the Harbour Commissioners' Grain Elevators arrived by car, the proportion in 1916 has reached 75%.

The use of the Harbour elevators as local marketing and distributing stores has become very much increased in recent years. Deliveries are made by carload in bulk or in bags, as required, and also by teams to city points.

The receipt of grain by cars required the organization of a gang of grain shovellers, as it requires four car shovellers working half an hour to unload a car of grain. 23,250 cars of grain were received during the season and 7,400 cars were loaded and shipped out.

The operation of the Harbour Commissioners' Elevator System during the season of 1916 may be given as follows:—

Elevator No. 1.

Total storage capacity in bushels, 4,000,000.

First vessel unloaded, May 2nd, 1916.

Last vessel unloaded, December 4th, 1916.

Total receipts, 17,343,534 bushels.

By water, 11,221,938 bushels, taken from 56 barges and 137 steamers, or 193 vessels.

By cars, 6,121,596 bushels, unloaded from 3,540 cars.

Delivery was made as follows:

| | |
|-------------------|--------------------|
| By conveyors..... | 9,519,983 bushels. |
| By cars..... | 414,453 |
| By teams..... | 240,533 |
| By bags..... | 3,319,829 |

Total.....13,494,798 bushels.

Elevator No. 2.

Total storage capacity in bushels, 2,662,000.

First vessel unloaded, May 19th, 1916.

Last vessel unloaded, October 9th, 1916.

Total receipts, 31,113,289 bushels.

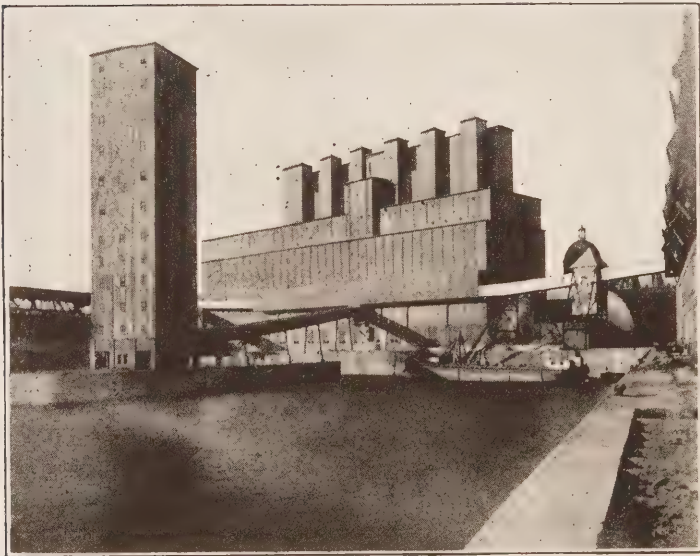
By water, 269,486 bushels, taken from 2 barges and 5 steamers,
or 7 vessels.

By cars, 30,843,803 bushels, taken from 19,710 cars.

Delivery was made as follows:

| | |
|-------------------|---------------------|
| By conveyors..... | 24,614,500 bushels. |
| By cars..... | 3,306,293 |
| By teams..... | 290,011 |
| By bags..... | 5,918,343 |

Total.....34,129,147 bushels.



Grain Elevator No. 2 and Marine Tower Jetty

At the close of the season, the elevators contained 3,255,160 bushels of grain, subject to storage or delivery as required.

The following table gives the record of the Harbour Commissioners' Elevator System from 1906 to 1916:—

| | Total quantity of grain handled or transferred— Bushels. |
|-----------|---|
| 1906..... | 944,321 |
| 1907..... | 1,078,289 |
| 1908..... | 8,661,350 |
| 1909..... | 11,691,071 |
| 1910..... | 21,526,727 |
| 1911..... | 21,007,164 |
| 1912..... | 25,561,655 |
| 1913..... | 44,000,000 |
| 1914..... | 62,250,000 |
| 1915..... | 37,317,367 |
| 1916..... | 51,548,720 |

Floating Grain Elevators.

Total amount of grain transferred and elevated into flour mill 3,091,897 bushels.

Four floating elevators were operated during the season.

Sacking of Grain.

As a result of observations made in European Ports, the designs for the West Extension to Elevator No. 1, which were made before the opening of the War, provided for a part of the long overhang of the elevator being converted into a sacking floor, principally with a view to local and out-of-town business.

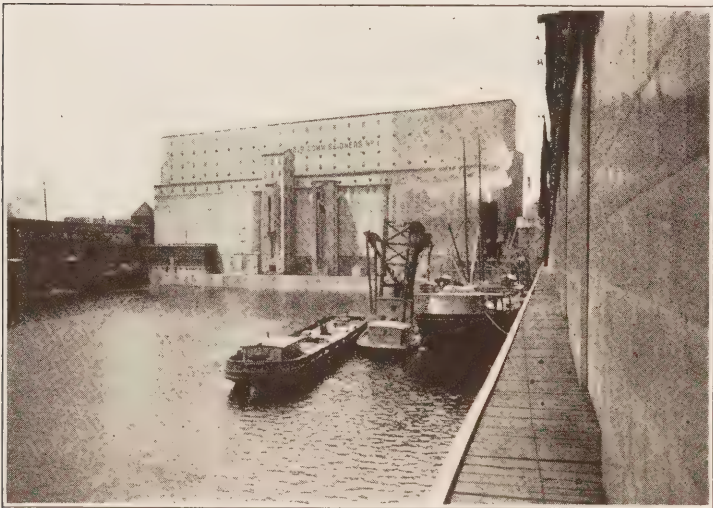
Immediately after the outbreak of the War, the West Extension to Elevator No. 1 not being sufficiently completed, automatic sacking outfits were organized in Elevator No. 2. Grave apprehension being felt, certain portions of the elevator were laid out for this work, which was conducted under a foreman who knew personally every man engaged.

In 1916 the sacking outfit was extended to Elevator No. 1, which had been completed. The work of bagging was done by automatic scales, the bags all requiring double sewing.

The orders for this work were given by Mr. J. A. Ruddick, Dairy Commissioner of the Department of Agriculture, who acted for the Imperial Government in connection with the shipping of these much-required supplies to Europe.

During the season, 9,238,173 bushels were sacked. In the summer months the sacks were transported by teams to the shipping sheds and during the winter months cars were loaded for shipping to Atlantic Ports.

This heavy emergency business was conducted through the Department of Agriculture in a most efficient and carefully organized manner, and notwithstanding the



Grain Elevator No. 1—June 7th, 1916

uncertainty, occasionally, of arrival of ships, the expedition of bagged grain was carried out most successfully.

The Compressing of Hay.

Another important work carried on in the Harbour during 1916 was the compressing of hay by the Department of Agriculture. For this work, since the opening of the War, the Department has had under lease Sheds 24 and 25. These sheds were under construction when the War broke out and were immediately put into service for this work, the location being very convenient to the railway terminal yard and to the docks.

From 12 to 16 presses were operated. For a large portion of the year work was carried on day and night.

These large double-storey sheds are particularly well adapted for the storage of such quantities of hay as frequently had to wait for shipment. All the presses were operated by electricity.

The total quantity of hay compressed during the year amounted to about 140,000 tons.

ELECTRICAL BRANCH.

Power and Operations.

The Harbour Commissioners purchased electric power from the Montreal Light, Heat and Power Co. for their power requirements, as follows:—

| | H.P. Hours. |
|--------------------------------------|-------------|
| Elevator No. 1 | 940,880 |
| Elevator No. 2 | 1,027,744 |
| Conveyor Galleries..... | 437,347 |
| Electric Hoists. | 109,570 |
| Electric escalators..... | 468 |
| Hay presses, power and lighting..... | 1,167,085 |
| Harbour Yard and Machine Shop..... | 63,188 |
| Electric lighting, general..... | 529,100 |

FREIGHT HOISTS IN CONNECTION WITH TRANSIT SHEDS.

Hoist No. 1, Sheds 11 and 12.

| | 1915 | 1916 |
|------------------------------------|-----------|----------|
| Total number of teams carried..... | 4,665 | 7,910 |
| Number of days in operation..... | 184 | 192 |
| Commenced operation..... | Apr. 23rd | May 1st |
| Stopped operation..... | Dec. 1st | Dec. 9th |

Hoist No. 2, King Edward Pier.

| | | |
|------------------------------------|-----------|----------|
| Total number of teams carried..... | 15,125 | 11,429 |
| Number of days in operation..... | 188 | 190 |
| Commenced operation..... | Apr. 22nd | May 1st |
| Stopped operation..... | Dec. 1st | Dec. 9th |

Hoist No. 3, Alexandra Pier.

| | | |
|------------------------------------|----------|-----------|
| Total number of teams carried..... | 11,707 | 29,928 |
| Number of days in operation..... | 179 | 203½ |
| Commenced operation..... | May 1st | Apr. 17th |
| Stopped operation..... | Dec. 1st | Dec. 9th |

Hoist No. 4, Jacques Cartier Pier.

| | | |
|------------------------------------|----------|----------|
| Total number of teams carried..... | 2,494 | 12,235 |
| Number of days in operation..... | 178 | 190 |
| Commenced operation..... | May 3rd | May 1st |
| Stopped operation..... | Dec. 1st | Dec. 7th |

Hoist No. 5, Sheds 24 and 25.

| | | |
|------------------------------------|-----------|----------|
| Total number of teams carried..... | 521 | 504 |
| Number of days in operation..... | 52 | 42 |
| Commenced operation..... | Mar. 19th | May 1st |
| Stopped operation..... | Dec. 1st | Dec. 2nd |

HARBOUR RAILWAY TERMINALS.

The tracks of the Harbour Commissioners' Railway extend from Victoria Bridge to the outlet of Lachine Canal and from McGill Street to Longue Pointe.

The total mileage of tracks in 1915 was 44.92 miles.

The total mileage at the close of the season of 1916 is 49.11 miles.

The Commissioners' Superintendent of Railway Terminals, Mr. J. Vaughan, operates the section between the foot of McGill Street and Longue Pointe.

The business may be sub-divided as follows, viz.—

1. Shunting to and from steamship berths in connection with the business of the various railway companies.

2. Switching between the various railway companies.
3. Handling freight by railway car between different points on the Harbour.
4. Local loading and delivery sidings.
5. Switching in connection with industries connecting with the Harbour railways.

The main section of the Harbour Terminals, which is situated between the foot of McGill Street and the Canadian Pacific Railway Place Viger Terminals, has to take care of the greatest portion of the railway business, as in that section are situated seventeen of the most important transit sheds in the Harbour and the two Harbour Commissioners' Grain Elevators. There are four main line tracks in this division, with sidings to the piers, berths and elevators. In the water front distance of one mile and a half there is a trackage length of 15 miles.



Harbour Railway Terminals from Elevator No. 2, looking eastward

The space available for surface tracks has been practically completely utilized and further enlargement of the space is out of the question.

In this section it is estimated that an average of 1,200 cars per day were handled during six of the summer months.

In these days of congestion of terminals and embargoes it is important to note that, during the busiest weeks of the season, the operations of the Harbour Terminals were conducted by Mr. Vaughan and his staff without interruption and with practically no delays.

This section of the Railway Terminals has, however, practically reached the limit of its possibilities under present working conditions.

Electrification would add a certain percentage of possible increase, but with the existing annual increase of traffic this would only be a temporary settlement.

For some years it has been apparent that taking into consideration the passenger and teaming traffic across the Harbour to and from the sheds and elevators, the usual method of either underground or elevated additional tracks must soon be provided. Owing to the flood and winter conditions tunneling is out of the question, and designs have been prepared therefore for three main line elevated tracks having sidings to the upper floors of the principal sheds. These elevated tracks would meet the Canadian Northern proposed connection with the Harbour from Dorchester Street Terminal and would be practically at the same level as the proposed elevated Grand Trunk tracks to Bonaventure Depot. It is argued that this work cannot be long delayed, even under the present financial conditions, as the results to be obtained are so necessary and important in connection with the growth of the trade and industry of the district.

During the season of 1916, important delivery sidings were constructed at the foot of McGill Street, Victoria Pier, Papineau Avenue, Moreau Street, Maisonneuve, Racine Pier and Longue Pointe. These local sidings have been of great advantage, as owing to their position, freight can be received and delivered economically and to the general satisfaction of the public.

The industrial business in connection with industries situated on the water front has grown to very considerable proportions and requests for extension are being made from time to time.

Since the completion of raising the tracks to high level, commenced in 1910, which makes possible regular summer and winter work, the increase of traffic has been phenomenal and in no year has the increase been greater than in 1916. The expenses of traffic upkeep in the central part of the Harbour during the winter, owing to paved surfaces and the difficulty of draining, have been high. As soon, however, as the elevated tracks are available, it is probable that the only work on the surface during winter will be the tracks connected with the Harbour Elevators and the local delivery sidings.

The growth of the city and industrial district eastward, has, to a great extent, been made possible owing to the availability of the Harbour Railways, and the steady progress of the new railway embankment and traffic down the river to Longue Pointe and further eastward, is one of the most important items of the Harbour Commissioners' construction work.

Floating Crane.

The Harbour Commissioners' Floating Crane was operated throughout the season as follows:—

| | |
|---|-------------|
| Number of working days..... | 201 |
| Number of days working..... | 106 |
| Number of hours working..... | 1,067 |
| Percentage of time in actual operation..... | 52% |
| TOTAL NUMBER OF LIFTS: | |
| Commercial..... | 694 |
| Commissioners' service..... | 66 |
| AVERAGE WEIGHT OF LIFTS: | |
| Commercial..... | 28 tons |
| Commissioners' service..... | 23 tons |
| GREATEST LIFT: | |
| Commercial..... | 70 tons |
| Commissioners' service..... | 70 tons |
| GREATEST TONNAGE FROM SINGLE SHIP: | |
| Ex S.S. "Manchester Inventor"..... | 557 tons |
| Total weight lifted during season..... | 21,082 tons |
| Total weight lifted during 1915..... | 6,274 tons |

Wharf Accommodation.

| | |
|---|---------------------------------------|
| The extent of the wharves at the end of the season is as follows: | |
| For 30 ft. draught at O.L.W. and over..... | 25,905 lin.ft. or 4.9062 miles |
| For 25 to 27½ ft..... | 13,442 lin.ft. or 2.5458 miles |
| Total deep draft..... | 39,347 lin.ft. or 7.4520 miles |
| For 20 ft. draught and under..... | 3,105 lin.ft. or 0.5880 mile |
| Total wharfage end of 1916... | 42,452 lin.ft. or 8.0400 miles |

Extent of Harbour Railway Tracks.

The extent of the Harbour Commissioners' Railway Tracks at the end of 1916 is as follows:—

1. South of Lachine Canal, Bicker-dike Pier, Windmill Point Wharf and West.....27,759 lin.ft. or 5.2574 miles
2. Sections 12 to 46, High Level, Main Line Track.....50,165 lin.ft. or 9.5009 miles
To piers, elevators, cross-overs and sidings, etc.....92,646 lin.ft. or 17.5466 miles
Sections 35 to 46, Low Level, Main Line Tracks.....12,150 lin.ft. or 2.3011 miles
Sections 46 to 71, High Level, Main Line Tracks.....27,051 lin.ft. or 5.1233 miles
3. To wharves, industries, etc.....36,845 lin.ft. or 6.9782 miles
4. To Guard Pier.....10,400 lin.ft. or 1.9697 miles
5. South Shore, St. Lambert.....2,300 lin.ft. or 0.4356 mile

Grand total tracks on Harbour in use

end of 1916.....**259,316 lin.ft. or 49.1128 miles**

MISCELLANEOUS.

Construction Materials.

The quantities of materials used during the season were:—

| | |
|-----------------------------|--|
| Cement..... | 10,000 barrels. |
| Rubble stone..... | 2,900 tons |
| Sand..... | 4,827 cu.yds. |
| Displacers..... | 1,254 tons |
| Crushed stone..... | 6,344 tons |
| Gravel..... | 3,378 tons |
| Railway ties..... | 13,000 |
| Timber..... | 150,446 lin.ft. and 1,151,974 ft. B.M. |
| Stone for macadamizing..... | 856 tons |

Labour.

The following table shows the maximum and average number of workmen employed by the Harbour Commissioners during the season of 1916:—

| | Maximum | Average |
|--|---------|---------|
| Maintenance of Harbour..... | 123 | 89 |
| Police..... | 45 | 43 |
| Construction of wharves, tracks, etc..... | 362 | 275 |
| Harbour Yard, carpenters, blacksmiths, etc. | 27 | 26 |
| Sawmill and Timber boom..... | 30 | 25 |
| Round House, machinists, etc..... | 21 | 18 |
| Machine Shop..... | 89 | 71 |
| Shipyard..... | 50 | 47 |
| Dredging Fleet, dredges, tugs, etc., crews.. | 201 | 175 |
| Construction West Extension Elevator No. 1 | 135 | 95 |
| Operation: Elevator No. 1..... | 64 | 46 |
| Elevator No. 2..... | 89 | 69 |
| Conveyor Galleries..... | 42 | 40 |
| Floating Elevators..... | 10 | 8 |
| Shovellers..... | 32 | 22 |
| Electrical Department, hoists, etc..... | 27 | 25 |
| Traffic Department..... | 103 | 88 |

LIST OF HARBOUR COMMISSIONERS DREDGING PLANT, 1916.

| Description of Vessel. | Hull. | | | When built | Engines. | | | | | Capacity of bucket c.y. | Depth to which Drg. can work | Remarks. | |
|---------------------------------|--------|------------------|--------------|------------|----------------|--------------------|----------------------------|-------------------------|--------------------------|-------------------------|------------------------------|----------|---------------------------|
| | Length | Breadth | | | Kind of Engine | No. of cylin- ders | Dia. of cylin- ders inches | Length of stroke inches | Pres- sure of steam lbs. | | | | |
| | | ft. in. over all | ft. in. beam | | | | | | | | | | ft. in. over all |
| | | | | | | | | | | | | | |
| Dredges. | | | | | | | | | | | | | |
| Boom Spoon Dredge J. Kennedy.. | 90 | 0 | 36 | 0 | 10 | 3 | 1892 | { | 2 | 16 | 18 | 128 | Wooden hull. |
| " " " No. 4..... | 90 | 0 | 36 | 0 | 10 | 9 | 1900 | | 2 | 16 | 18 | 140 | Steel hull. |
| " " " No. 5..... | 104 | 0 | 36 | 0 | 10 | 9 | 1910 | | 2 | 16 | 18 | 140 | Steel hull. |
| " " " No. 6..... | 104 | 0 | 39 | 0 | 10 | 9 | 1912 | | 2 | 16 | 18 | 140 | Steel hull. |
| Elevator Dredge "Premier" | 86 | 0 | 31 | 5 | 9 | 2 | 1905 | { | 2 | 14 | 15 | | Wooden hull. |
| Derricks. | | | | | | | | | | | | | |
| Clam shell Derrick No. 1..... | 76 | 0 | 27 | 6 | 8 | 0 | 1899 | { | 2 | 12 | 14 | 110 | Wooden hull. |
| " " " No. 2..... | 80 | 8 | 30 | 0 | 7 | 6 | 1900 | | 2 | 10 | 12 | 120 | Wooden hull. |
| " " " No. 3..... | 76 | 0 | 27 | 6 | 8 | 0 | 1900 | | 2 | 12 | 14 | 110 | Wooden hull. |
| " " " No. 4..... | 75 | 0 | 26 | 10 | 7 | 6 | 1892 | | 2 | 12 | 14 | 110 | Wooden hull. |
| " " " No. 5..... | 75 | 0 | 26 | 10 | 7 | 6 | 1892 | | 2 | 12 | 14 | 110 | Wooden hull. |
| " " " No. 6..... | 75 | 0 | 26 | 10 | 7 | 6 | 1892 | | 2 | 12 | 14 | 110 | Wooden hull. |
| " " " No. 7..... | 88 | 0 | 31 | 0 | 9 | 0 | 1913 | | 2 | 12 | 14 | 140 | Wooden hull. |
| " " " No. 8..... | 88 | 0 | 31 | 0 | 9 | 8 | 1915 | | 2 | 12 | 14 | 140 | Wooden hull. |
| Drilling & Blasting Boat..... | 80 | 0 | 27 | 0 | 5 | 6 | 1895 | { | | | | 100 | Three 5 in. steam drills. |
| Drill Boat No. 1..... | 60 | 0 | 20 | 0 | 5 | 0 | 1909 | | | | | 80 | Two 5 in. steam drills. |
| Tug Boats. | | | | | | | | | | | | | |
| Tug "St. Peter" | 74 | 8 | 16 | 1 | 8 | 6 | 1875 | { | 1 | 20 | 22 | 125 | Wooden hull. Rblt. 1903 |
| | | | | | | | 1900 | | 1 | 10 | 12 | 125 | Composite hull. |

| | | | | | | | | | | | | | |
|-------------------------------|------------|----------|------------|----------|----------|----------|-----------------|--------------------------------------|---|----------------|----------|-----|---|
| "Robert Mackay" | 80 | 9 | 17 | 6 | 10 | 0 | 1899 | Vertical condensing | 1 | 16 32 | 24 | 125 | Steel hull. |
| "Alphonse Racine" | 90 | 0 | 18 | 6 | 12 | 1 | 1905 | Vertical condensing | 1 | 16 32 | 24 | 150 | Steel hull. |
| "No. 1" | 90 | 0 | 26 | 0 | 6 | 0 | Rebt. 1893 | Horizontal non-condensing | 1 | 15 | 20 | 100 | { Iron sheathed with elm. Formerly Floating Elevator, No. 1. |
| "Sir Hugh Allan" | 130 | 0 | 26 | 6 | 15 | 0 | 1911 | Vertical triple expansion condensing | 3 | 16 25 40 | 24 | 180 | Steel hull, twin screws. |
| "Hon. John Young" | 91 | 8 | 22 | 0 | 9 | 0 | 1911 | Vertical compound condensing | 2 | 12 24 | 18 | 140 | Steel hull, twin screws. |
| "Beaver" | 64 | 3 | 15 | 3 | 7 | 3 | 1892 | Vertical high pressure | 1 | 18 | 20 | 115 | Wooden hull. |
| "Passe-Partout" | 49 | 1 | 11 | 3 | 5 | 7 | 1912 | Vertical high pressure | 1 | 9 | 10 | 125 | Wooden hull. |
| "David Seath" | 75 | 0 | 19 | 0 | 10 | 2 | 1915 | Vertical condensing | 1 | 13 26 | 22 22 | 150 | Wooden hull. |
| Testing boat. | { 73 73 | { 3 3 | { 14 14 | { 0 0 | { 3 3 | { 1 1 | { 1897 1897 | | | | | | Two wooden scows braced 16 ft. apart. |
| Scows. | | | | | | | | | | | | | |
| 2 Flat deck scows Nos. 2 & 4. | 75 | 0 | 20 | 2 | 6 | 0 | 1876 | Capacity. | | | | | |
| 1 " " No. 10. | 90 | 0 | 20 | 0 | 5 | 5 | 1891 | 67½ yds. | | | | | |
| 2 " " Nos. 21 & 22. | 85 | 0 | 25 | 0 | 7 | 5 | 1891 | 80 " | | | | | |
| 2 " " Nos. 23 & 24. | 85 | 0 | 25 | 0 | 6 | 9 | 1891 | 150 " | | | | | |
| 5 " " Nos. 25-29. | 85 | 0 | 25 | 0 | 6 | 9 | 1892 | 150 " | | | | | |
| 5 " " Nos. 31-35. | 85 | 0 | 25 | 0 | 6 | 9 | 1893 | 150 " | | | | | |
| 5 " " Nos. 39 & 40. | 85 | 0 | 25 | 0 | 6 | 9 | 1903 | 150 " | | | | | |
| 2 " " Nos. 41 & 42. | 87 | 0 | 25 | 0 | 7 | 6 | 1904 | 150 " | | | | | |
| 12 " " Nos. 43-54. | 100 | 0 | 30 | 0 | 9 | 0 | 1911-15 | 300 " | | | | | |
| 2 Dump scows, Nos. 36 & 37. | 106 | 0 | 26 | 10 | 9 | 6 | 1899 | 200 " | | | | | |
| 1 " " No. 38. | 106 | 0 | 26 | 10 | 9 | 6 | 1900 | 200 " | | | | | |
| 2 " " (Gilbert's). | 60 | 0 | 20 | 0 | 6 | 0 | ..... | 100 " | | | | | |
| 1 large coal scow. | 138 | 0 | 32 | 0 | 8 | 5 | ..... | 400 tons. | | | | | |
| 1 floating concrete machine. | 100 | 0 | 34 | 0 | 8 | 6 | { 1915 Rebt. | | | | | | |
| 1 floating pile driver. | 50 | 9 | 24 | 2 | 5 | 8 | 1896 | | | | | | |
| 1 floating air plant. | | | | | | | | | | | | | { Converted floating grain elevator. |

HARBOUR DREDGING.

Statement showing the number of days worked by each dredge and the quantity dredged at each place in 1916.

| Name of Dredge | Places at which dredging was done | Time of Service | | Quantities dredged | | Character of Material dredged |
|--------------------------|---|---------------------------------|-------|--|------------|--|
| | | Days | Total | Cu. yards | Total yds. | |
| Dredge "John Kennedy" .. | New Channel South of St. Helen's Island..... South Bickerdike Pier..... | 151 9 | 160 | 103,500 7,800 | 111,300 | Rock, hard pan and stones. Rock. |
| Dredge No. 4..... | Maintenance Dredging.... New Channel South of St. Helen's Island..... S.S. "Jason" | 8¾ 145 1¾ | 155½ | 3,450 109,200 | 112,650 | Loose rock and mud. Compacted disintegrated shale, hard pan and boulders. |
| Dredge No. 5..... | Maintenance Dredging.... South Bickerdike Pier..... S.S. "Jason" | 8 157 2 | 167 | 1,800 161,496 | 163,296 | Loose rock and mud. Rock and hard pan. |
| Dredge No. 6..... | New Channel South of St. Helen's Island..... Sections 29-30, cribseats.. South Bickerdike Pier..... Sections 100-101..... Sec. 100-101 Ship Channel Lauzon Dry Dock..... | 60 17 24 5 13 56 | 175 | 92,800 12,000 24,000 5,000 7,800 40,125 | 181,725 | Rock, hard pan and stone. Rock and hard pan. Rock and mud. Clay. Clay and stones. Blasted rock. |
| GRAND TOTAL... | | | 657½ | | 568,971 | |

PORT OF MONTREAL
Combined Statement showing the Number and Tonnage of all Vessels that arrived in Port during the past Ten Years.

| Year | TRANSATLANTIC | | MARITIME PROVINCES | | INLAND | | GRAND TOTAL | |
|-----------|---------------|-----------|--------------------|---------|---------|-----------|-------------|-----------|
| | Vessels | Tonnage | Vessels | Tonnage | Vessels | Tonnage | Vessels | Tonnage |
| 1907..... | 381 | 1,339,014 | 361 | 586,972 | 14,420 | 3,620,950 | 15,161 | 5,546,936 |
| 1908..... | 364 | 1,315,688 | 375 | 642,916 | 12,434 | 3,589,124 | 13,173 | 5,548,028 |
| 1909..... | 371 | 1,436,963 | 299 | 474,450 | 10,991 | 3,146,494 | 11,661 | 5,057,907 |
| 1910..... | 411 | 1,658,414 | 336 | 574,808 | 13,636 | 4,327,799 | 14,383 | 6,561,021 |
| 1911..... | 401 | 1,695,613 | 361 | 642,639 | 11,670 | 4,275,019 | 12,432 | 6,613,271 |
| 1912..... | 409 | 1,775,487 | 327 | 628,437 | 12,586 | 4,649,767 | 13,322 | 7,053,691 |
| 1913..... | 477 | 2,020,333 | 343 | 670,202 | 13,426 | 5,703,467 | 14,246 | 8,394,002 |
| 1914..... | 551 | 2,039,133 | 365 | 716,385 | 12,225 | 6,288,939 | 13,141 | 9,044,457 |
| 1915..... | 484 | 1,657,728 | 331 | 603,546 | 8,572 | 4,222,426 | 9,387 | 6,483,800 |
| 1916..... | 569 | 1,965,161 | 129 | 169,295 | 7,297 | 3,558,872 | 7,995 | 5,693,328 |

PORT OF MONTREAL

Statement showing the Classification of Transatlantic Vessels that arrived in Port during the past Ten Years.

| Year | Steamships | | Barques | | Ships and Brigs | | Schooners | | Grand Total | |
|-----------|------------|-----------|---------|---------|-----------------|---------|-----------|---------|-------------|-----------|
| | No. | Tonnage | No. | Tonnage | No. | Tonnage | No. | Tonnage | Vessels | Tonnage |
| 1907..... | 381 | 1,339,014 |  |  | .. |  |  | ..... | 381 | 1,339,014 |
| 1908..... | 364 | 1,315,688 |  |  | .. |  |  | ..... | 364 | 1,315,688 |
| 1909..... | 371 | 1,436,963 |  |  | .. |  |  | ..... | 371 | 1,436,963 |
| 1910..... | 410 | 1,656,794 | | | 1 | 1,620 |  | ..... | 411 | 1,638,414 |
| 1911..... | 401 | 1,695,613 |  |  | .. |  |  | ..... | 401 | 1,695,613 |
| 1912..... | 409 | 1,775,487 |  |  | .. |  |  | ..... | 409 | 1,775,487 |
| 1913..... | 477 | 2,020,333 |  |  | .. |  |  | ..... | 477 | 2,020,333 |
| 1914..... | 551 | 2,039,133 |  |  | .. |  |  | ..... | 551 | 2,039,133 |
| 1915..... | 483 | 1,656,631 | | | 1 | 1,094 |  | ..... | 484 | 1,657,728 |
| 1916..... | 569 | 1,965,161 |  |  | .. |  |  | ..... | 569 | 1,965,161 |

PORT OF MONTREAL
Statement showing Classification of Vessels that arrived in Port, for the last Ten Years, from the Lower
St. Lawrence and Maritime Provinces.

| Year | Steamships | | Schooners | | Grand Total | |
|-----------|------------|---------|-----------|---------|-------------|---------|
| | No. | Tonnage | No. | Tonnage | No. | Tonnage |
| 1907..... | 343 | 579,930 | 18 | 7,042 | 361 | 586,972 |
| 1908..... | 350 | 640,244 | 25 | 2,672 | 375 | 642,916 |
| 1909..... | 273 | 470,936 | 26 | 3,514 | 299 | 474,450 |
| 1910..... | 306 | 572,022 | 30 | 2,786 | 336 | 574,808 |
| 1911..... | 330 | 639,752 | 31 | 2,887 | 361 | 642,639 |
| 1912..... | 292 | 625,099 | 35 | 3,338 | 327 | 628,437 |
| 1913..... | 299 | 666,053 | 44 | 4,149 | 343 | 670,202 |
| 1914..... | 321 | 712,327 | 44 | 4,058 | 365 | 716,385 |
| 1915..... | 312 | 601,916 | 19 | 1,630 | 331 | 603,546 |
| 1916..... | 97 | 165,473 | 32 | 3,822 | 129 | 169,295 |

PORT OF MONTREAL

Statement showing the Nationalities and Tonnage of Sea-going
Vessels that arrived in Port during the season of 1916,
that were navigated by 41,440 seamen.

| Nationality | Number of Vessels | Tonnage |
|----------------|-------------------------|-----------|
| British..... | 650 | 2,030,240 |
| Italian..... | 13 | 52,392 |
| Norwegian..... | 13 | 22,914 |
| American..... | 18 | 19,731 |
| Danish..... | 3 | 4,642 |
| French..... | 1 | 4,537 |
| Total..... | 698 | 2,134,456 |

Of the above, 665 were of iron or steel, with a tonnage of 2,130,535,
and 33 were built of wood, with a tonnage of 3,921 tons.

PORT OF MONTREAL

Statement showing the dates of the Opening and Closing of Navigation, the First Arrival and the Last Departure for sea; also the Greatest Number of Vessels in the Port at one time, during the past Ten Years.

| Years | Opening of Navigation | Closing of Navigation | First Arrival from Sea | Last Departure for Sea | Greatest Number of Vessels in Port at one time | | | | | |
|-----------|-----------------------|-----------------------|------------------------|------------------------|--|------------|-----|------------|------|------|
| | | | | | Sea-going | | | Inland | | |
| | | | | | No. | Date | No. | No. | Date | Date |
| 1907..... | April 23rd | Dec. 15th | May 2nd | Nov. 29th | 29 | May 24th | 103 | July 8th | | |
| 1908..... | " 22nd | " 10th | April 30th | " 26th | 24 | June 21st | 104 | June 30th | | |
| 1909..... | " 16th | " 27th | " 23rd | " 28th | 22 | Nov. 9th | 107 | Aug. 31st | | |
| 1910..... | " 1st | " 7th | " 11th | Dec. 1st | 25 | May 18th | 122 | Sept. 18th | | |
| 1911..... | " 23rd | " 29th | " 26th | " 3rd | 24 | Aug. 18th | 85 | June 5th | | |
| 1912..... | " 23rd | " 21st | " 30th | " 3rd | 22 | July. 31st | 86 | Aug. 21st | | |
| 1913..... | " 9th | " 27th | " 19th | Nov. 29th | 29 | Oct. 3rd | 92 | July 25th | | |
| 1914..... | " 22nd | " 15th | " 29th | Dec. 4th | 56 | Aug. 21st | 94 | Aug. 17th | | |
| 1915..... | " 11th | " 15th | " 30th | " 11th | 34 | Sept. 21st | 66 | July 26th | | |
| 1916..... | " 22nd | " 18th | May 1st | " 6th | 41 | Sept. 12th | 62 | July 25th | | |

THE
AMERICAN ASSOCIATION OF PORT AUTHORITIES

EXTRACTS

from

PAPERS AND PROCEEDINGS
FIFTH ANNUAL CONVENTION

HELD IN THE BOARD ROOM OF THE OFFICES
of

THE HARBOUR COMMISSIONERS
OF MONTREAL

September 13-15, 1916.

INTRODUCTION.

"The purpose of the Association is to exchange information relative to port construction, maintenance, operation, organization, administration and management, and to formulate recommendations, as far as possible, for uniform policies, and the standardization of port facilities, and to promote city, state and national publicity of all port affairs; also, for the encouragement of water-borne transportation, and to provide a permanent organization of port authorities of the Americas."

WEDNESDAY, SEPTEMBER 13TH, 1916.

The Fifth Annual Convention of the American Association of Port Authorities met in Montreal, Canada, on September 13th, 14th and 15th, 1916, at the Harbour Commissioners' Office, at 57 Common Street. The first meeting of the Convention was called to order at 10 o'clock on the morning of September 13th by Mr. W. G.

Ross, First Vice-President of the Association and Chairman of the Harbour Commissioners of Montreal.

MR. ROSS—Gentlemen, we will open the Convention. We are very pleased indeed to see such a large representative gathering here. Without saying anything further, I will call on controller A. Guy Ross, here representing the Mayor of Montreal, to say a few words.

CONTROLLER ROSS—Mr. President and Delegates of the American Association of Port Authorities.

In the absence of His Worship the Mayor of Montreal, who asks me to express his great regret at not being able to be present to-day in person, I feel it an honour and pleasure to extend to you the official greeting of the City of Montreal and the cordial welcome of its seven hundred thousand people.

I understand that you have held Conventions at New York, Baltimore, New Orleans, and most recently at the beautiful city of Los Angeles, where you have seen and discussed the great development taking place in the ports of those cities within the past few years, and no doubt you will take equal interest in noting and studying here in Montreal the various features of our great National Port, of which we are justly proud.

The holding of your Conventions at cities of the United States and the Dominion of Canada, where important matters and problems in connection with port development are debated, is an advantage to both countries, and is incidentally another evidence of the cordial feeling existing between us.

Your particular object in coming to Montreal, the metropolis of the Dominion, is to inspect the Harbour improvements of Canada's national port, over whose

wharves pass annually about thirty per cent. of the total commerce of the Dominion, and I am going to leave to your host, Mr. Ross, Chairman of the Board of Harbour Commissioners, the pleasant duty of describing and explaining to you all that relates to the port.

I should like, however, as representing the Mayor, to point out for your information a few facts about our city which may interest and possibly surprise you.

In the first place, I should like you to know Montreal is one of the oldest cities on the North American continent, as it was originally founded by Maisonneuve in the year 1642. The city is situated on an island, formed by the St. Lawrence and Ottawa Rivers, and is about thirty miles long and between seven and ten miles in width.

The city is cosmopolitan in character, and in conjunction with the adjoining municipalities has a population of about three-quarters of a million, of which probably more than two-thirds are of French origin, while there is a considerable Hebrew element, accounting for over forty thousand of the population.

Although situated about one thousand miles from the open sea, Montreal is the national seaport of Canada, and is at the same time the terminus of the great inland waterways which run from the head of Lake Superior, down through Lake Huron, Lake Erie, Lake Ontario and the St. Lawrence River.

It is also a great railway city, in that it is the terminus of three transcontinental lines, namely, the Canadian Pacific Railway, the Grand Trunk Railway and the Canadian Northern Railway.

You can therefore appreciate the great interest the City of Montreal with its numerous industries takes in

the development of its port, and how closely we follow the progress that has been made in that direction through the efforts of succeeding Boards of Commissioners, of which none have done better work than that of your hosts, Mr. Ross and his colleagues, General Labelle and Mr. Robertson.

I hope you will spare time before you leave us to inspect not only the Harbour but also the principal parts of our city, and I have asked your hosts to let us take you for a drive through the city and Mount Royal Park, which I trust you may find interesting.

As you have quite a programme before you, I shall close my brief address by repeating our cordial welcome and expressing the wish that you may thoroughly enjoy your visit to the City of Montreal.

PRESIDENT MR. W. G. ROSS—After listening to the eloquent remarks of Controller Ross for the Mayor of Montreal, there **is** indeed very little for me to say, other than to wish you on behalf of the Harbour Commissioners of Montreal a cordial and warm welcome to the Port of Montreal.

I had the honour of attending conventions of the Association in New Orleans and at Los Angeles, and at each of them I was deeply impressed with the admirable manner in which they were conducted, while the example there set is indeed difficult to follow. It is hoped, however, that the reception which will be accorded you and information gained will prove to be equally satisfying.

Before the close of the last Convention in Los Angeles, I expressed the hope that we should soon have the honour and pleasure of greeting you in Canada, and it was particularly gratifying to us, and worth the trip of twelve thousand miles that we made last September, to have

you choose Montreal, Canada's chief city, the commercial capital of the Dominion, and its National Port, as the meeting place of your 1916 Convention.

Controller Ross struck the right chord to-day when he said that our annual gatherings were productive of a harmonious international co-operation. Nothing less is possible when one considers that you have come to us through Canada's great front door, the portals of which stretch between three thousand miles, between two peoples, unarmed by the frown of fortress or battery, where the voice of the sentry is still, where the doors are always open, the keys having been lost in over one hundred years of harmony and mutual respect.

Those of you, such as Mr. Bridges and Mr. Williams, and also Mr. Fullerton of Vancouver, who have come across this Canada of ours, occupying as she does the northern half of this continent, though possessing as yet less than one-tenth of the population of the United States, must nevertheless have been greatly impressed with its magnitude and with the ever-growing commerce which is tributary to the Port of Montreal.

While naturally interested in the country as a whole and its different transportation routes, you have come here mainly for the purpose of examining the facilities created in the Port of Montreal, the furthest inland seaport in the world, with one thousand miles of river leading to the ocean on one side of her and fifteen hundred miles of inland navigation leading to the heart of the continent on the other side.

As most of you know, the Port of Montreal is owned by the people of Canada, controlled and administered by three National Trustees appointed by the Federal Government, and is one example of public ownership in North

America where every foot of the foreshore of the river for sixteen miles on either side is owned by the people, a condition that does not exist in any other port of America.

It will afford us the greatest pleasure to show you during the next three days the largest transfer grain elevator system yet assembled at any seaport, with its grain storing capacity of 12,000,000 bushels and its handling capacity of 2,000,000 bushels per day, carrying the golden grain from the central warehouses to sixteen berths in the central part of the Harbour, without in any way interfering with their loading or unloading operations or the necessity of their requiring to move from one berth to another to secure their grain cargoes.

In your brief visit to this country the impression will be no doubt created in your minds that, at any time, Canadians are heirs to a great legacy, a country of vast dimensions, natural wealth and wonderful resources; the country of big rivers, mountains, mines, forests, agriculture and commerce, and it is to take care of this that the Harbour Commissioners are providing the facilities which you will have the opportunity of inspecting to-day and to-morrow. The Commissioners are happy to have you with them in Montreal to-day and shall do everything we possibly can to make your stay an instructive and enjoyable one.

MR. J. SPENCER SMITH, PRESIDENT OF THE JERSEY HARBOUR BOARD—Mr. Controller and Mr. President, I think we are particularly fortunate in coming here to see this wonderful Harbour, one thousand miles in from the ocean, and yet one of the finest—if not the finest—port in point of organization facilities on the Eastern seaboard. While we are discussing the different subjects which will come before us, and which are of interest in the way of port

development, we can see the same matters exemplified right here in the City of Montreal. About two months ago I was up here with two of our Council, men who are leading publicists in our city, men who have studied political economy, men who have studied the science of government and its relationship to the welfare of the people, and their remarks on leaving your city were these: **“We thought that we were progressive in the States, but we are about forty years behind the times. When we view all that the port authorities are doing here in the way of public ownership and operation in the Port of Montreal, and the splendid facilities which they are giving to the shipping interests and the shipping world, we are indeed far behind.”** I thought that was a wonderful tribute to the progress attained by and the progressive spirit of the Canadian authorities. And so you are to be congratulated and we are to be congratulated that it is our privilege to gather here and inspect your Harbour and have our meeting here. I am only expressing the thought of every member present when we thank you for the courteous address of welcome, and we are only anticipating what is going to happen when we say we know we will enjoy our visit and stay with you.

PAPER NO. 1

PORT ORGANIZATION WITH A SPECIAL REFERENCE TO MONTREAL.

By W. G. Ross,

President, Harbour Commissioners of Montreal.

Centuries ago the sailing vessels that carried on the commerce of the world at that time, on arriving at a port or in a river, could be easily and safely accommodated without providing the elaborate and costly wharves that



Montreal Harbour in 1762

From original engraving by Thos. Jeffreys, from drawing by Thomas Patten.

are necessary for the shipping of to-day. A rough wharf with a few mooring posts sufficed to give a safe berth to the craft then employed.

With the growth, however, in the number and tonnage of shipping and the consequent establishment of a regular commerce many new problems emerged, foremost amongst which was the fact that a port, in order to become a suitable terminus for shipping and a safe emporium for valuable cargoes, must be developed on modern lines, and contain much which would have been of slight utility to the commerce of ancient times.

Ships grew in dimensions and value, as well as the cargo carried, and when both ship and cargo were considered together, it became evident that some special provision and organization had to be made against the various risks incidental to the conditions of international trade, such as storms, floods, thefts, fire, etc.

This problem was solved in the construction of docks or wharves, as circumstances required, many ports needing locked docks because of the rise and fall of the tide, such as at London and Liverpool, while in other ports, especially in America, the fluctuation was so trivial that considerable expense both in construction and maintenance was saved by the provision of wharves.

Modern commerce engendered greater needs and demanded efficient service; ships must be brought as near as possible to the great trade centres, and as their dimensions increased the problem of deepening and straightening channels arose. The old fire basket that had served as a flare—assisting vessels in entering and departing from the harbour—had to be replaced by an efficient lighthouse and buoys; the entrance to the harbour, rivers and the channels leading to it had to be buoyed and lighted, and eventually points along the whole coast where shipping passed were marked and lighted in a consistent scheme, so that the mariner could, by means of the lights, pick up his position as clearly by night as by day.

By these means safe ingress and egress were assured to harbours, but there was an equally important problem to solve, because ships not only enter and leave harbours, but they stay there sometimes for days and weeks at a time. Whilst remaining in port, a ship being liable to damage, and as time went on and ships increased in value, this liability tending to increase very greatly, some authority had to be responsible for the safety of the shipping, and thus docks and wharves had to be provided. From small beginnings these too developed until of recent years the demands made upon the harbour authorities have assumed very different dimensions from what they were 50 or 100 years ago, necessitating in the case of a

large port a very complete staff of highly trained officials, as well as a suitable labour force to cope with the work. Now, these entail the operation of dry dock facilities for the overhauling and repairing of ships, the operation of grain elevators and a terminal railroad, a lighting plant, dredging fleet, crane, towing and a hundred and one other services in a highly developed form.

In early days, small separate authorities might, without inconvenience, attend to the embryonic working of the various spheres here indicated, but with the great expansion of modern commerce and the very considerable amount of capital at stake, speedy dispatch and the saving of every possible hour became of greater and greater moment to shipping. Needless port delays being productive of great expense and inconvenience, it has become necessary to concentrate the management and supervision of all the essentials of a port in the hands of one authority, designed to organize the different factors of a port so that each shall become a component part of an organic whole.

Up to within recent years, port organization in American ports had been left almost entirely in the hands of private interests or railroads, each vying with the other to capture freight, and secure the best competitive terminals. Of late, however, private control and ownership is being substituted by public control, to which the sea ports of Europe attribute their growth and prestige, and almost every American sea port of note is presently being organized and developed in a like manner.

The admissible limits of this paper would certainly be exceeded were an attempt made to discuss the organizations existing at the different ports of the world, and very little service would be rendered, as members interested

in this phase of the subject can refer to the very able paper presented at New Orleans by Mr. W. J. Barney, on European Ports, as well as the annual reports of the Harbour Commissioners of Montreal for 1914 and 1915, dealing with European ports and Pacific Coast ports respectively. "The Ports of the United States," just issued by the Bureau of Foreign and Domestic Commerce, deals in a splendid manner with the American ports.

With a knowledge of the above, the topic assigned to me will be treated only in so far as the port of Montreal is concerned, as the organization of the other Canadian ports is modeled or being modeled after that of Montreal.

Back in 1830 port organization was begun in Montreal, for in that year an Act of Parliament was passed giving power to the Government to appoint three Commissioners for the purpose of carrying into effect an act providing for improvements in the Harbour. That Commission was styled the Trinity House of Montreal, and existed until 1855, when the Harbour Commissioners of Montreal was constituted.

Since that time many changes have taken place in the number of Commissioners comprising the Board, as many as eleven acting between 1894 and 1907, when the number was reduced to three, to be appointed by the Governor-in-Council and to hold office during pleasure.

The Commissioners have the control and management of the affairs of the Harbour, which extends from above Victoria Bridge to the foot of the Island of Montreal, a distance of about 17 miles, and includes both sides of the River St. Lawrence up to the ordinary high water mark. By this Act of Incorporation they have power to make

and enforce by-laws, fix harbour dues, apportion wharf space, construct, maintain and operate wharves, grain elevators, railways and other works, as well as to expropriate land adjoining the Harbour required for Harbour purposes.

There are no wharves under private ownership, every foot of the foreshore of the Harbour of Montreal being owned by the people. Berths and wharf spaces are allotted to companies or persons from time to time, but not for longer than a year, except in rare cases and under special agreements. In practice, however, the same berths and spaces are generally re-allotted to the same parties year after year, as long as requested and the public interest permits. But the Commissioners reserve and exercise the right to send any vessel to any unoccupied berth even although it is one allotted to the agents of other vessels.

To accommodate industries already existing along the Harbour front, or desiring to locate there, special wharves are built upon the industry guaranteeing that if the wharfage, as per tariff collected upon the goods landed on or shipped from such wharves, does not amount to a sum equivalent to 6% of the cost of the construction and maintenance of the wharf; the industry so leasing the same will each year, for a period of ten years, pay to the Commissioners the deficiency, if any, but the surplus in any year accrues to the Commissioners.

No charge is made for wharf space for goods beyond the wharfage rates thereon, and merchandise is kept as far as possible constantly in transit. Cargo unloaded is allowed to remain on the quays only four days; then it is subject daily to an extra heavy charge of twice the original wharfage paid. Should the cargo become an obstruction, it is liable to be moved to warehouses by the Commis-

sioners, at the owners' cost, or to an unoccupied section of the Harbour where it is subject to rental for the space so used. This prevents congestion, keeps the wharves and transit sheds clear, and removes cause of serious delays experienced in many ports, where, because of lack of method, the piers are utilized for the temporary storage of materials.

Vessels pay neither tonnage nor berthage dues in the Harbour of Montreal, the only expense being for hospital dues and port warden's fee, which are insignificant.

The present harbour facilities are provided almost entirely along the north bank of the river, and mainly within a distance of about $6\frac{1}{2}$ miles from the Victoria Bridge. In early days, all vessels lay alongside shore wharves, but now the shipping facilities include both shore wharves and piers, the latter projecting into the stream at a slight angle downstream in order to facilitate the handling of vessels.

The piers in the central part of the Harbour are about 1,000 feet long, 300 feet wide, are separated by slips 550 feet wide and are covered with 16 transit sheds, two stories in height.

Each side of the pier is occupied by two steel and concrete freight sheds, or rather one long continuous shed divided into two parts by a concrete partition wall. Two tracks are laid along the inner side of each shed and the intervening space forms a roadway which is about 45 feet wide clear of the tracks. The whole space between the sheds is covered with a concrete foundation floor, upon which is laid a paving of scoria blocks, the top of which is flush with the top of the rails.

At the most recent sheds, there is a railway track on the water side of the pier, for the transference of freight

between ship and railway car direct and vice versa.

The extent of wharves at the end of 1915 available for shipping was $7\frac{3}{4}$ miles.

Special attention has been given in the Harbour of Montreal to the handling of grain, where it is received by rail, by lake vessels and by canal boats, and where the bulk of the grain received is delivered to ocean steamers for shipment.

There are three elevators in the Harbour of Montreal, two owned and operated by the Harbour Commissioners with a combined capacity of 6,622,000 bushels, and another owned and operated by the Grand Trunk Railway Co. with a capacity of 2,150,000 bushels. The former serve a system of belt conveyors by which grain can be delivered to ocean vessels while lying at the regular berths at all the 16 sheds above described, and without interference with the handling of general cargo. The latter has conveyors also, but these serve only the berths adjacent to the elevator, so that ships must be moved to these berths to receive grain cargo. The Commissioners also own a fleet of floating grain elevators, used for taking grain from lake vessels or canal boats and loading it directly into ocean liners.

The above mentioned stationary elevators are capable of receiving daily the following quantities of grain:

| | | |
|-----------------------------|-----------|---------|
| Elevator No. 1..... | 450,000 | bushels |
| Elevator No. 2..... | 650,000 | " |
| Grand Trunk Elevator..... | 400,000 | " |
| <hr/> | | |
| and of delivering | 1,500,000 | " |
| Elevators Nos. 1 and 2..... | 1,100,000 | bushels |
| Grand Trunk Elevator..... | 400,000 | " |
| <hr/> | | |
| | 1,500,000 | " |



View taken from roof of Head Office Building, looking South-West, showing entrance to Lachine Canal, Grand Trunk Railway Elevator, etc.

Twelve ocean liners may be loaded with grain from the elevators at once, without in any way interfering with the unloading or taking in of grain received by cars, lake vessels or canal boats.

Harbour Railway: Previous to 1907, the railway tracks on the Harbour, all of which were owned by the Commissioners, were leased to and operated by the different railway companies. There were three units of this character, extending the entire limits of the Harbour. Under that system, so far as interchange of business is concerned, the shipper was subject to very considerable delays in that the line bringing the goods in for delivery to a connecting line was not particularly interested in expedition, and, in addition, the charges were excessive, because each particular unit handling cars originating with another railroad or another unit, destined for delivery to still another, charged its own particular switching rate.

As a result, if a car came in on a railroad occupying the upper limits of the Harbour, and had to be transferred to one in the lower portion, the switching charges amounted to something like \$12.00 per car with a delay of several days in some cases. Now that same service is performed by the Harbour Railway expeditiously at the rate of \$5.00 per car for through traffic and \$2.50 to any point in the central harbour. The Commissioners have, therefore, demonstrated not only the economic advantages of publicly administered switching facilities to the shipping public, but have shown that it is self-sustained.

Under the present system, the different companies, at points designated in the Harbour, hand over their cars properly marshalled to the Commissioners, who place them where desired, at the freight sheds, grain elevators, and other places for loading and unloading, and with the re-distributing of railway tracks, the cost of removing freight to and from the cars has been reduced by the Commissioners from 45 cents to 22½ cents per ton, practically eliminating the expensive use of the tracks with their attendant congestion. The length of Harbour shore line served by the Harbour Railway at present is seven miles, but the total mileage of track is 50 miles.

This railway not only affords facilities for trans-shipping freight and switching cars from one railway line to another, and from railroad to wharf and vice versa, but also connects with the different industries located along the Harbour front, to which are shunted coal, raw materials, supplies and manufactured goods, and complete articles are shipped out to all points of the country or to the steamships in the Harbour. Before the advent of the Harbour railway these industries were obliged to dray every pound of their freight in and out, a most expensive

process; while now, for \$2.50 a car, their incoming freight is deposited at their doors and their outgoing cars are delivered to any avenue of transportation going out of the city. The rates charged by the Commissioners for this service are very moderate, and the existing facilities and manner of operation give such good dispatch that there is an urgent demand by new industries building up along the water front for the prolongation of the Harbour terminals to new sites and to wharves specially being constructed.

A new line of traffic was developed by this department two years ago in the transporting of coal and other commodities from the ships' side to industries having connection with the harbour tracks, and vice versa. The movement of this traffic by the Commissioners saved the industries considerable in cartage and handling, the commodities being handled at so much per ton.

The number of cars handled by the Harbour railway system in 1908 was 60,000 and in 1915 157,000.

Floating Cranes: For the handling of heavy freight, such as boilers, machinery, etc., the Commissioners have provided a floating crane, with a lifting capacity of 75 tons at a 54 foot radius. The average weight of lifts made during 1915 by the machine was $10\frac{1}{2}$ tons and the maximum 75 tons. During that season 557 lifts were made, the percentage of the time the crane was in actual operation being 66 per cent.

Floating Dry Dock: Opposite the city of Maisonneuve, which adjoins the city of Montreal, a site of 30 acres in extent has been reclaimed in the Harbour and leased to Canadian Vickers Limited for a period of 50 years. At this site a basin is provided for a floating dry dock and on the land a shipbuilding and repairing plant and muni-

tion works have been installed. The floating dock, named the "Duke of Connaught," was built in England and towed across the ocean. This dock has a lifting capacity of 25,000 tons, and is capable of docking the largest vessel which navigates the St. Lawrence. In May, 1916, there was launched from these yards the "J. D. Hazen," the largest ice breaker in the world, which has been sold since that date to the Russian Government to aid in extending the season of navigation at the Port of Archangel.

Coal Unloading Plants: There are several large plants of this kind operated by companies which import coal in steamers owned and chartered by them. The largest are those of the Dominion Coal Company, which has one at each end of the Harbor. The one at the upper end has an unloading capacity of 18,000 tons per ten hour day. Each plant has five towers traveling on a trestle along the pier so as to be adjusted to the position of the ships' hatches, a hinged boom is lowered to project horizontally over the vessel and on this runs a hoisting trolley. A self-loading grab bucket or clam, of 2 tons capacity, takes the coal from the hold, and is run back to deposit it in the storage bin on the pier. From this it is delivered by gravity through spouts to cars or wagons or by small trucks to canal boats.

Freight Unloading Facilities: The piers and sheds of the Harbour are designed with a view to the handling of cargo by the winches and cargo derrick booms of the steamers, which is common at North American ports. Freight handling machinery installed so far are transporter cranes in the upper floors of two of the sheds to handle freight between the sheds and cars or between ship and shed and electric elevator hoists, of 15 tons capacity, for

carrying loaded wagons and their horses between the upper and lower floors of the sheds.

Construction and Maintenance Plants: While there is practically no deposit of silt in the channel or slips and basins, there is a considerable amount of dredging required for enlarging and deepening the Harbour. For this work and also for the construction of wharves and piers, bulk-heads, etc. (all of which is universally carried out departmentally by the Commissioners), there is an extensive floating plant, which includes 5 dredges, 2 drill-boats, 8 floating derricks, a floating pile-driver, concrete mixing plant, 11 tugs, a testing boat, a large coal scow, a floating air plant and 38 scows of the flat and dump types. This organization is capable of placing and dredging in the works some three million cubic yards of excavated material, of building half a mile of crib work, and concrete quay walls of a height from the foundation to the cope of 60 feet, of building 50,000 cubic yards of concrete, of constructing railway sheds, culverts, and, in fact, also every phase of port construction.

Police Department: In 1913 the Commissioners organized the Harbour Police Force, which now consists of 45 members, for the regulation of traffic on the wharves, maintenance of order and protection of life and property within the Harbour of Montreal. This force attends the arrival and departure of every passenger vessel, supervises the number of persons carried on river passenger boats, etc., and notwithstanding the free movement of traffic at all hours, the fact that not a single accident of any note occurred since the organization of this force is evidence of the worth and efficiency of this department.

The general organization of the Port of Montreal is like that of other corporations, with the exception that it

is a special one for the performance of services peculiar to its port business.

The work carried on by the organization may be divided into the following main subdivisions:

(a) Construction and maintenance of Harbour works.

As already stated, all improvements and extensions to the Harbour of Montreal, excepting the main ship channel, are carried out departmentally, as well as the repairing and maintaining of the wharves, etc., the only work let out by contract being the superstructure and equipment of the grain elevators and transit sheds. In normal times about 2,000 employees are on the pay roll.

(b) Collection of Port Dues and Rentals.

(c) Operation of revenue producing equipment, such as Harbour Railway, grain elevators, transit sheds, floating and land cranes, electric hoists, scales, etc.

(d) Supervision of port traffic.

The above are in charge of the Secretary-Treasurer, Chief Engineer, Comptroller, Superintendent of Railway Terminals, and Harbour Master, who report to the Commissioners. The Board is also advised by a Consulting Engineer, Sir John Kennedy, for 35 years its Chief Engineer.

The following is the organization of the Commission:

Secretary-Treasurer: Assistant Secretary, Wharfinger and Paymaster, Supervisor of Wharfages, Purchasing Agent, Claims Department, Cashiers, Counsel and Additional Counsel, Real Estate, Police Department, Scale Department.

Comptroller: Assistants, Accountants, General Storekeeper, Assistant Storekeeper, Cost Clerk, Assistant Cost Clerk, Timekeepers, Checkers, Timber Inspector.

Chief Engineer: Assistant Chief Engineer, Assistant

Engineers, Superintendent of Dredging Fleet, Mechanical Superintendent, Superintendent of Wharf Work, Superintendent Grain Elevators, Assistant Superintendents, Electrical Engineer Cranes, Hoists, etc.

Superintendent of Railway Terminals: Assistant Superintendent, Yardmasters, Locomotive Foremen, Round House Department.

Harbour Master: Deputy Harbour Master.

From the foregoing it will be seen that Montreal's water front terminals are organized for joint rail and marine use, and that the entire system is operated as a harmonious whole, as will be seen when the author will show the members over the development and facilities created in the Harbour of Montreal at the time of the Convention in September next.

PAPER NO. 6

"CANADIAN PORTS"

By Frederick William Cowie, B.A.Sc., M.Inst.C.E.,
Chief Engineer, Harbour Commissioners of Montreal.

INTRODUCTION.

The total land area of Canada is 3,600,000 square miles, the density of population is less than 2 per square mile as compared, for instance, with 31 per square mile in the United States.

The vast area, the tremendous distances and the distribution of the sparse population makes the problem of transportation in Canada a recognized question of vital importance.

Investigations have been made and are being made by statesmen, by great commercial minds and by expert engineers, but in Canada, although the matter has been greatly aided by the vigorous canal and railway policy,

it has not been solved, as may be judged from the fact that of 312,000,000 bushels of wheat shipped from the head of the lakes in the 12 months ending 31st July, 1916, 181,000,000 bushels have been diverted from Canada and shipped through United States ports.

The fundamental difficulties in the way of production and marketing in Canada are climate and distance. It has been found, however, year by year, that climatic conditions do not govern to the extent expected. Vast areas of land, both in the older Provinces of Quebec and Ontario, and in the four Western Provinces, have been found economically productive. Varieties of grain have been cultivated which will mature before the early frosts and therefore almost limitless areas are now open for successful exploitation by the farmer.

In Canada we are proud to recognize that much of our effort and the continuation of the struggle to sustain Canadian commercial existence has been owing to the desire to overcome the keen and persistent competition of the great American corporations with their unlimited capital, their wide influence for business and their splendid organization.

In a Transportation System, the Harbour Terminal is one of the most important economic links. Port projectors and authorities have accomplished much that is good, but many costly mistakes, however, have been made. The non-success may in many cases be attributed to a lack of proper consideration by the projector, want of skill in the design and improper administration by the Port Authorities.

A railway corporation will naturally desire the many advantages of an exclusive territory; the pioneer capitalist considers it his due to reap the reward of his hazardous

early adventures; an influential community may desire, or even force, port improvements and traffic which will naturally be advantageous for its population and enterprise.

The advantages of an Association of Port Authorities and an Annual Convention, where discussion may bring out serious views to compel attention, are therefore apparent.

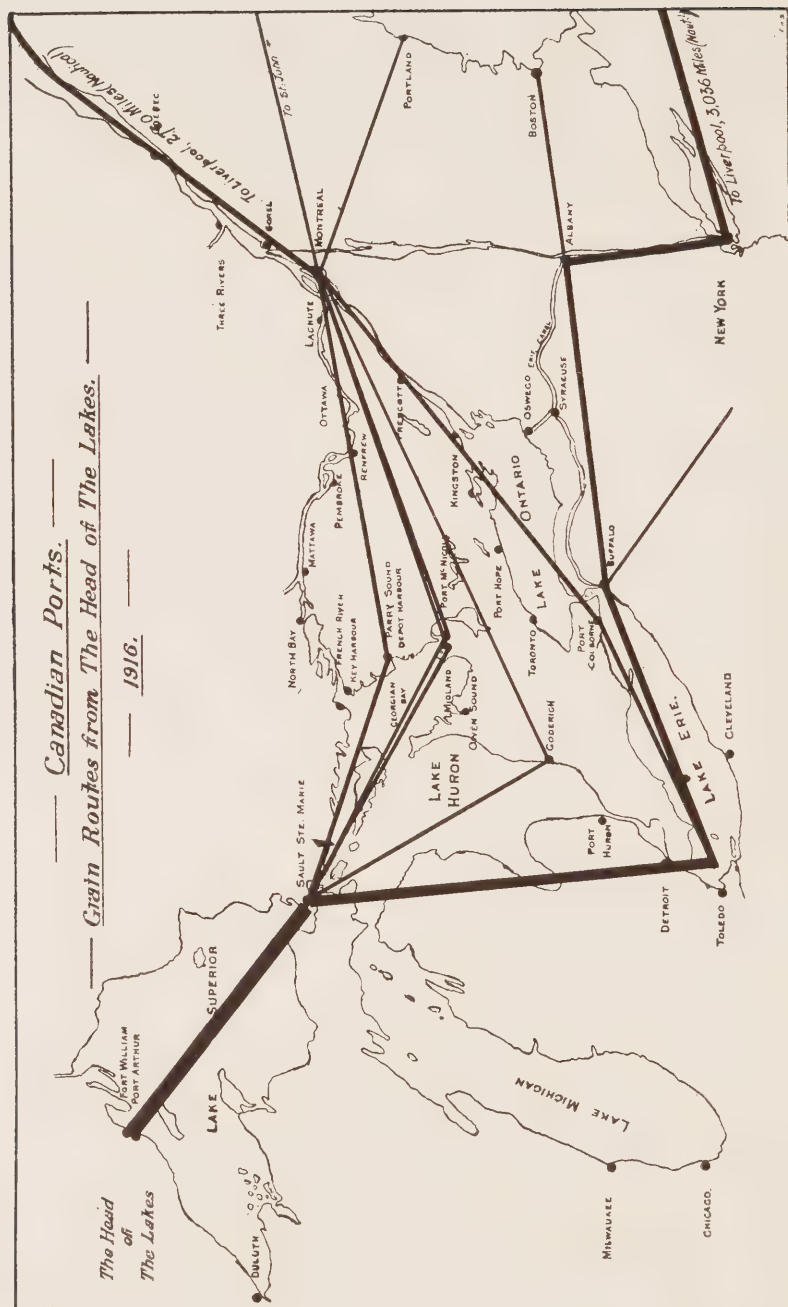
It was the intention of this paper to describe two Atlantic, two St. Lawrence Ports, typical Lake Ports, and two Pacific Ports. For the last six months, very much valuable matter has been collected on these various ports, so much so that the subject became altogether too large. A description of such Ports as St. John, N.B., Quebec, Vancouver and Prince Rupert, with their varied principles of design and organization, could not be abbreviated.

Several of the members of the Association have asked particularly regarding the new developments at Halifax, the Port of Montreal and the principles and types of the Terminal Harbours in connection with the Canadian service on the Great Lakes.

The scope of this paper has therefore been changed so that the above three subjects only will be dealt with. (Chapters on The Port of Montreal and Halifax Harbour omitted for want of space.)

CANADIAN TERMINAL HARBOURS ON THE GREAT LAKES.

The coast line of the Canadian Lake Ports, extending from Kingston on Lake Ontario, through Lake Erie, Lake Huron, Georgian Bay and Lake Superior to the United States border at Pigeon River, comprises a total length of about 1,500 miles. In this coast line there are 35 harbours,



many of them being excellent examples of local ports. The harbours at Kingston, Toronto, Hamilton, Goderich and Owen Sound hold very important places in the history of Canadian development.

The evolution of lake harbour construction, from the sheltered landing place for schooners to the modern wharves for St. Lawrence type of lake steamer of 2,500 tons and a draught of 14 feet, has necessitated a high degree of skill and enterprise.

From the Atlantic to the Pacific, across country, the distance is approximately 2,600 miles. The distance from the head of the lakes to the Atlantic Coast is approximately 1,000 miles, or within 300 miles of the central point of Canada.

The Canadian Western Railways all converge to the head of the lakes, so that the transportation systems may take advantage of the water route during the eight months of open navigation.

Probably the most important economic link in the chain of Canadian transportation system is the twin-terminal Harbour at Fort William and Port Arthur, commonly known as the "Head of the Lakes." From this point grain and products of the Northwest are carried:

By the water route to Montreal.

By the lake and rail route via Canadian lake ports.

By full-sized lake vessels to Port Colborne.

By full-sized lake vessels to American ports.

The problem of Canadian transportation, East and West, is of such fundamental importance that the typical harbours of the lake and rail route will be analyzed as showing their economic value, strategic position and types of design and construction.

The twin ports of Fort William and Port Arthur on

Lake Superior are therefore chosen as examples, reference also being made to the Georgian Bay ports of Port McNicoll and Tiffin and to the Welland Canal terminal at Port Colborne.

FORT WILLIAM AND PORT ARTHUR HARBOUR TERMINALS.

The Hudson's Bay Trading Post at Fort William, on the River Kaministiquia, flowing into Thunder Bay on the northwest shore of Lake Superior, was the starting point of the canoe route for explorers and traders communicating between the Provinces of Canada and the Northwest Territories from the earliest times in the history of that region.

In 1857 the Red River Expedition was organized. The object of that expedition was to report upon the best means of opening a line of communication between Lake Superior and the Red River Settlement. The Canadian Northwest at that time consisted principally of settlements along the banks of the Red River, and the problem of transportation was then, as now, of vital importance.

The Reports on the "Line of Route," by S. J. Dawson, Esq., C.E., of 1868 and 1869 record details of explorations extending over several years, which resulted in the "Dawson Route."

The original proposition included a road and water route of 131 miles and 332½ miles, respectively. It involved several dams and one lock, five trans-shipment points and a harbour at Thunder Bay, Lake Superior, and the total original estimate was given as \$222,400. The Harbour works were itemized as "a pier required at the depot, Thunder Bay, Lake Superior, \$2,500."

The argument of Mr. Dawson (who later made a name for himself in the Parliament of Canada) would be equally

sound at the present time. The people of Minnesota constructed stage roads from St. Paul, and practically all the transportation to and from the Red River Settlement was taken over this route at a cost of \$4.50 to \$5.00 per 100 pounds. Mr. Dawson argued that as it was evident that the trade of the Northwest Territories was of value to Minnesota it ought to be of some importance to Canada. He estimated that by the "Dawson Route" the cost of transportation would be reduced to a maximum of \$2.00 per 100 pounds and that it was clear that by opening the proposed communication the trade, amounting to several million dollars annually, would be transferred to Canada.

The Harbour or Terminus on Lake Superior was then one of the most important points for decision, and the advantages and disadvantages of the Pigeon River, Thunder Bay and Nipigon Bay were carefully considered. Improved water routes were then looked for, the question of a railway being argued but dismissed with the remark that although the ground was not unfavourable, the idea of such a work was premature.

Mr. Lindsay A. Russell, Assistant Surveyor on the Red River Expedition and later Surveyor-General for Canada, located the terminus for the "Dawson Route" in 1858 and 1859, under instructions that it should be accessible to any size of vessel navigating the lakes. He found that a shoal at the mouth of the Kaministiquia limited the draught up the river to $5\frac{1}{2}$ feet, and he assumed that dredging would be continuously required if this channel was deepened. It was also reported that this river froze over at an early date in the autumn and that the approaches by roadway to the water-front would be difficult. The terminus or "depot" was therefore located three miles to the eastward of the mouth of the river,

beyond the shoal, where it was reported that "vessels of ocean draught could lie at an ordinary wharf extending 500 feet out from the shore."

The depot was renamed Prince Arthur's Landing after the Red River Expedition in 1870, in honour of Prince Arthur, now Field Marshal His Royal Highness the Duke of Connaught, Governor-General of Canada, who, serving with his regiment, accompanied the expedition. The name is now Port Arthur.

The location of the harbour at Port Arthur resulted in the construction of a breakwater in 1868, and of the beginning of the Harbour works which are now of such considerable extent and great importance.

The projected line of railway from the Provinces of Ontario and Quebec to the Pacific Coast again renewed, from the point of view of railway transportation, the question of the Canadian port on the northwest shore of Lake Superior. Mr. Sanford Fleming, Engineer-in-Chief, first reported in 1872 and again in 1874 and 1877 that the principles laid down in connection with the route involved a line "which would touch Lake Superior at such a point in its course as would make the prairie region accessible from the lake during the season of navigation." This resulted in the serious consideration by the railway engineers of another proposed terminus on Lake Superior, viz., Nipigon Bay.

As against the propositions in Thunder Bay, Nipigon Bay almost had the call for the Terminal Harbour. Fortunately for the "Lake and Rail Route" this was not accepted, as it would have involved a longer rail haul without greatly shortening the water route, and therefore decreased the economic value of the Canadian Route.

The final location was apparently settled by the fact

"that the navigation of Lake Superior could at a trifling cost be extended from Thunder Bay up the River Kaministiquia to a point about eight miles above Prince Arthur's Landing" to West Fort William, which was satisfactory.

The original contract for the Canadian Pacific Railway, from the head of lake navigation, as described by Sanford Fleming in 1876, "commenced at a point on the north bank of the River Kaministiquia, 604 feet above the level of the sea, the line taking a northwest course, the maximum gradient being 1 in 100." The first locomotive engine was landed at Fort William in August, 1876, just forty years ago.

Improvements to the Prince Arthur's Landing Harbour, as it was originally called, were commenced as Public Works of Canada, in connection with the "Dawson Route," and to the River Kaministiquia shortly after the projection of the Canadian Pacific Railway.

"Our bay is very deep, in some portions, I am told by some of our fishermen, from 200 to 300 fathoms. Our docks are four, with only an average depth at furthest out cribs of 14 feet or so. This harbour is not yet closed. A tug with 150 tons of freight on a scow from Duluth mines arrived yesterday morning, discharged this evening and is now loading a cargo of fresh fish for Duluth, and will leave to-morrow forenoon."

(Dated) "Prince Arthur's Landing, 28th Dec., 1882."

(Signed) "COLLECTOR."

FORT WILLIAM HARBOUR.

At Fort William the Harbour consists almost exclusively of riverside quays. The River Kaministiquia has three distinct channels or outlets. There are wharves

at the mouth of each channel and at the junction of the Mission Channel with the main river there is a turning basin and another $6\frac{1}{2}$ miles up, with wharves and terminals on each side. The channels have been dredged to a depth of 25 to 30 feet.

Coal docks, elevators, oil docks, flour mills, industrial works and freight and passenger wharves are located on the different branches of the river up as far as five miles.

The width of the Kaministiquia Channel is 600 feet, the Mission Channel 500 feet, and the McKellar Channel 400 feet, and the depth at the wharves 25 feet.

The total water-front of these splendid land-locked harbour channels is about 26 miles.

PORT ARTHUR HARBOUR.

Port Arthur Harbour is situated on the north shore of Thunder Bay, adjoining and to the eastward of Fort William Harbour. Although Thunder Bay is not large, breakwaters have been constructed to form the perfect protection required for vessels operating at the various wharves and terminals.

The works of the Western Dry Dock Co. are situated at the extreme eastern limit of the Harbour.

The shipyard at Port Arthur is very well equipped for the construction of lake vessels of the largest size and also for the building of passenger and freight boats. The "Naronic," length 385 feet by 59 feet, with passenger capacity of over 600 cabin passengers, tonnage 6,000, was built in the shipyard at Port Arthur. The shipyard, it is stated, has a capacity for building lake vessels of 14,000 tons burthen and 625 feet long.

There are a number of wharves of different lengths: the Canadian Pacific Railway wharf, 990 feet long, 75

feet wide, with shed upon it, 400 feet long; the Canadian Northern Railway wharves have been recently extended in length and size, 5 railway tracks alongside; the Fisher's wharf, 700 feet long by 40 feet wide, with icehouse and packing-house upon it; Clevat's wharf, 770 feet long by 55 feet wide, with two storehouses and shed; the coal wharf is 930 feet long; the Canadian Northern Railway wharf, 600 feet long, with freight shed upon it and railway track alongside. The Canadian Northern Railway Company has a coal dock with a storage capacity of 650,000 tons and at which a large quantity of coal can be discharged in ten hours by the plant.

As an important link in the transportation system, the Government has given generous aid towards the development of these twin ports, breakwaters, aids to navigation, dredging, turning basins and public elevators.

The Canadian Grain Commission, created for the purpose of studying, investigating and reporting on matters connected with the collection, inspection, transportation and storage of grain, have their headquarters at this "Head of the Lakes." This Commission has fulfilled a public service of inestimable value, and in view of the growing future of the Northwest its labours have only just begun. Their work is within the view of the farmer, who is keen to forward his products to market to the best fraction of a cent of advantage, and this Commission, with its extensive powers and active organization, has boldly attacked and overcome many of the difficulties of despatch and economic transport.

There is no comprehensive authority in either or both of these important Harbours.

The Canadian Government aids in keeping navigation open as long as possible by operating ice-breaking vessels.

Up to the present, the unit system has prevailed. Each city, each railway, each terminal elevator, each protection work and each wharf is self-contained. The result is that there are splendid units competing with each other and giving most remarkable results. Such efficient and economical units co-operating and interchanging would, without doubt, give the best possible example of an economical feature of the Canadian transportation problem.

PROGRESS OF THE TWIN CITIES.

The following table of population of the cities of Fort William and Port Arthur shows the phenomenal growth of these cities, almost all of which may be attributed to the Harbour terminals and transportation features:

| | Fort William | Port Arthur |
|-----------|--------------|-------------|
| 1901..... | 3,633 | 3,214 |
| 1911..... | 16,499 | 11,220 |
| 1916..... | 20,854 | 12,500 |

The authorities state that as a result of the war the population in 1916 is very much reduced as compared with 1914.

THE INDUSTRIAL SITUATION.

The manufacturing industries located at Fort William and Port Arthur have expanded to a wonderful degree in the past few years. Warehouses and assembling plants and the works of the Western Dry Dock and Shipbuilding Co. all add to the business of the ports and their success.

APPROACHES TO THE HARBOURS.

For the largest and most severe as regards weather conditions, the Harbour situation is well nigh perfect.

Vessels approach the wide entrance to Thunder Bay with perfect security. Once inside, local security may be found from any storm.

By railway the grades eastward, in the direction of heavy traffic, are favourable.

HARBOUR IMPROVEMENTS.

The physical conditions are favourable for Harbour design and construction. Weather conditions and the character of the small river entering up the Harbour render up-keep and maintenance at small cost. Expansion to any degree is quite possible.

The future possibilities of the port are equal to the immense probabilities of increased traffic.

LIST OF GRAIN ELEVATORS AT FORT WILLIAM AND PORT ARTHUR.

FORT WILLIAM.

C.P.R. Elevator "D," on Kaministiquia River.

Erected 1897-1914.

Total storage capacity 7,250,000 bush. (On C.P.R.)

Operating capacity per hour:

In by cars 25,000 "

Out to vessels 200,000 "

Empire Elevator Co.'s Elevator, at Mouth of Kaministiquia River.

Erected 1904.

Total storage capacity 1,750,000 bush. (On C.P.R.)

Operating capacity, per hour:

In by cars 10,000 "

Out to vessels 40,000 "

Grain Growers' Elevators "B" and "E" on Kaministiquia River.

Erected 1902-1906.

Total storage capacity 2,500,000 bush. (On C.P.R.)

Operating capacity, per hour:

In by cars 12,000 "

Out to vessels 25,000 "

Eastern Elevators "A" and "C," on Kaministiquia River.

Erected 1890.

Total storage capacity 2,235,000 bush. (On C.P.R.)

Operating capacity, per hour:

In by cars 10,000 "

Out to vessels 30,000 "

Fort William Terminal Elevator "F," on Kaministiquia River.

Erected 1913.

Total storage capacity 3,250,000 bush. (On C.P.R.)

Operating capacity, per hour:

In by cars 12,000 "

Out to vessels 45,000 "

G.T.P. Elevator, at Mouth of Mission River.

Erected 1910-1912.

Total storage capacity 5,750,000 bush. (On G.T.P.)

Operating capacity, per hour:

In by cars 24,000 "

Out to vessels 120,000 "

Out by cars 130,000 "

Consolidated Elevator Co.'s Elevator, on Kaministiquia River.

Erected 1906-1910.

Total storage capacity 1,760,000 bush. (On C.P.R.)

Operating capacity, per hour:

In by cars 10,000 "

Out to vessels 30,000 "

Ogilvie's Elevator, on Kaministiquia River, Opposite McKellar River.

Erected 1904-1907-1909-1915.

Total storage capacity 2,000,000 bush. (On C.P.R.)

Operating capacity, per hour:

In by cars 8,000 "

Out to vessels 25,000 "

Western Terminal Elevator, on Kaministiquia River.

Erected 1909-1914.

Total storage capacity 2,000,000 bush. (On C.P.R.)

Operating capacity, per hour:

In by cars 12,000 "

Out to vessels 35,000 "

Muirhead-Bole Elevator, Corner Pacific Avenue and Athabasca

Erected 1911.

Total storage capacity 35,000 bush. (On C.P.R.)

Operating capacity, per hour:

In by cars 2,000 "

Out by cars 2,000 "

Paterson's Elevator "K," Montreal Street.

Erected 1912-1913.

Total storage capacity 80,000 bush. (On C.P.R.

Operating capacity, per hour: and G.T.P.)

In by cars 2,000 "

Out by cars 2,000 "

Paterson's Elevator "O," on Kaministiquia River, foot of

Heath Street.

Erected 1914.

Total storage capacity 100,000 bush. (On C.P.R.)

Operating capacity, per hour:

In by cars 2,400 "

Out to vessels 15,000 "

(When addition of 100,000

bushels is completed) 25,000 "

Superior Elevator, Mary Street.

Erected 1913.

Total storage capacity 110,000 bush. (On C.P.R.)

Operating capacity, per hour:

In by cars 3,000 “

Out by cars 3,000 “

Western Elevator “G,” on Kaministiquia River.

Erected 1915.

Total storage capacity 70,000 bush. (On C.P.R.)

Operating capacity, per hour:

In by cars 2,000 “

Out to vessels 3,000 “

Or out by cars 2,000 “

Black & Muirhead Elevator, on Kaministiquia River.

Erected 1909-1914.

Total storage capacity 180,000 bush.

(Connected direct with C.P.R.; C.N.R., and G.T.P. by private track.)

Operating capacity, per hour:

In by cars 1,400 bush.

Out to vessels 20,000 “

Bole Grain Company Elevator, on Hardisty Street.

Erected 1912.

Total storage capacity 20,000 bush. (On C.P.R.)

Operating capacity, per hour:

In by cars 1,000 “

Out by cars 1,000 “

Dwyer Elevator, on Kaministiquia River, Island No. 2.

Erected 1913-1915.

Total storage capacity 250,000 bush. (On C.P.R.)

Operating capacity, per hour:

In by cars 2,000 “

Out to vessels 10,000 “

Guys Elevator, Corner Atlantic and Athabasca Streets.

Erected 1912.

Total storage capacity 35,000 bush. (On C.P.R.)

Operating capacity, per hour:

In by cars 2,000 “

Out by cars 2,000 “

PORT ARTHUR.

National Elevator, Second Avenue.

Erected 1915.

Total storage capacity 50,000 bush. (On C.N.R.)

Operating capacity per hour:

In by cars 2,500 “

Out by cars 4,000 “

*Davidson & Smith Elevator, on Thunder Bay, at Mouth
of McIntyre River.*

Erected 1914.

Total storage capacity 750,000 bush. (On C.P.R.)

Operating capacity, per hour: and C.N.R.)

In by cars 8,000 “

Out to vessels 40,000 “

Horn & Co's Elevator, on Shores of Thunder Bay.

Erected 1882.

Total storage capacity 750,000 bush. (On C.P.R.)

Operating capacity, per hour:

In by cars 4,000 “

Out to vessels 10,000 “

*Canadian Government Elevator, on Shore of Thunder Bay,
at Mouth of McIntyre River.*

Erected 1913.

Total storage capacity 3,250,000 bush. (On C.P.R.)

Operating capacity, per hour: and C.N.R.)

In by cars 40,000 “

Out to vessels 75,000 “

Canadian Northern Elevator, on Shores of Thunder Bay.

Erected 1903-1904-1912-1913.

Total storage capacity 9,250,000 bush. (On C.N.R.)

Operating capacity, per hour:

In by cars 24,000 “

Out to vessels 280,000 “

*Empire Company's Elevator, Thunder Bay, Near Mouth of**McIntyre River.*

Erected 1909.

Total storage capacity 1,500,000 bush. (On C.N.R.)

Operating capacity, per hour:

In by cars 12,000 “

Out to vessels 40,000 “

| | <i>Grand Total</i> | <i>Grand Total</i> | <i>Grand Total</i> |
|----------------------|-------------------------|---------------------|----------------------|
| | <i>Storage Capacity</i> | <i>In, per hour</i> | <i>Out, per hour</i> |
| | <i>Bushels</i> | <i>Bushels</i> | <i>Bushels</i> |
| Fort William | 29,375,000 | 140,000 | 640,000 |
| Port Arthur | 15,550,000 | 90,500 | 449,000 |

The Romance of Grain Shipments from the Head of the Lakes.

The total shipments from Fort William and Port Arthur for all grains, are recorded as follows:

1900-01 6,500,000 bushels

1904-05 31,000,000 “

1913-14 201,500,000 “

1915-16 335,000,000 “

(For year ending July 31st, 1916.)

AREA AND RESOURCES OF CANADA.

The total known area of Canada is 3,729,665 square miles. In acres the figures would be: Land area, 2,306,502,453 and water area, 30,482,942.

The area inspected and declared capable of cultivation, not including the North West Territories and Yukon, is 358,835,000 acres. The area under grain crops in 1916,

has been reported to be 33,591,365 acres and the value estimated at one billion dollars.

The actual exports for 12 months ending June, 1916, for three items, has been given as follows:

| | |
|---------------------------|------------------|
| Agricultural produce..... | \$323,000,000.00 |
| Manufactures..... | 284,000,000.00 |
| Animal produce..... | 108,000,000.00 |

The future probabilities of transportation through the Head of the Lakes may be judged by the vast area of land not yet put under cultivation in the Great North West.

FIGURES OF POPULATION.

| | <i>United States proper</i> | <i>Canada</i> | <i>Relative Proportion</i> |
|--------------|---------------------------------|---------------|--------------------------------|
| 1800-01..... | 3,929,328 | 240,000 | 6% |
| 1850-51..... | 23,191,876 | 1,842,265 | 7% |
| 1880-81..... | 50,442,066 | 4,324,810 | 8% |
| 1900-01..... | 66,809,196 | 5,371,315 | 8% |
| 1910-11..... | 81,731,957 | 7,206,643 | 8% |

Vast therefore as the growth of the United States, the population of Canada has increased at a still greater rate. With the immense areas of land open for cultivation, with the immense possibilities for production, who can say what the future will bring? Port authorities will surely fail in their duties if they do not have the forethought to realize what will be required in 10 or in 25 years, and they would do well not to plan projects or build ports which may not be modified to suit the requirements of even the more distant future, with its certain need.

That the agriculture value of Canada's western areas will continue may be judged by the statement that the first foot in depth of soil of the three western provinces,

Manitoba, Saskatchewan and Alberta, is worth more than all the mines in the mountains from Alaska to Mexico and more than all the forests from the United States boundary to the Arctic Sea. And next in value are the three feet of soil which lie underneath the first foot. The land may be tilled for 20 successive crops without much diminution of yield, owing to the richness and depth of the subsoil.

The extent and value of the forests of Canada are well known. Conserved and properly cut and manufactured they may be considered as an important staple future factor in the progress and trade of Canada.

A conservative estimate of the forest lands is given as 450,000,000 acres and a staple annual production of \$100,000,000 per annum.

The mineral wealth of Canada is also becoming a matter of increased surprise. Canada was formerly known to be rich in coal, iron, gold and silver. In the last few years, however, the yields of copper, nickel, lead, asbestos, natural gas, petroleum, cement clays, gypsum and the many by-products have resulted in most gratifying returns and have added new sources of revenue to the Ports of Canada.

The fisheries of Canada are every year increasing in value and importance. With rapid communication between Northern ports on both the Atlantic and Pacific, and also with fishing stations on Hudson's Bay and the Great Lakes, and improvements in refrigeration, the value and commerce in the fishing trade is one of the important resources of Canada.

With special features of resources, such as agriculture, mining, forests and fisheries and other natural products,

the future of the Canadian industrial situation is becoming wonderfully favourable.

Limited population and capital, with limited transportation conditions, held Canada far behind the United States for many years. Coal was dear, labour was scarce and distances were great. During the past few years, with improved transportation conditions, and with the proven value of the natural resources, population has increased and capital is becoming more and more available. The country benefits by the export of natural products, but when those natural products are manufactured they usually represent three times the natural value. The key to the assured success in this line in Canada will be water power and electricity.

THE VALUE TO CANADA OF TRANSPORTATION SYSTEMS.

The Canadian Pacific Railway opened for traffic thirty years ago. Only a few of the great men in Canada were great enough to have real faith in that enterprise. The direct results of one single transportation system may be of interest to Port authorities, viz.:

The City and Harbour of Vancouver.

The City and Terminals of Winnipeg.

The Twin Cities and Harbour Terminals of Fort William and Port Arthur.

The Ports of Owen Sound and Port McNicoll.

The City and Harbour Terminals of Montreal to at least one-third.

The City and Harbour of St. John, N.B., to the same proportion.

Two other Transcontinental Railway Systems have within a year been opened from the Pacific to the Atlantic. It is now no experiment. If Providence favours the North

West, as in the past, the next 30 years should see the above cities and harbours trebled and twice as many others built up to their present degree.

That is the *raison d'être* of the Canadian transportation projects and the Canadian Ports.

Transportation through the country and ports, economical terminals, well-equipped ports, industrial enterprises, all thoroughly investigated by the best brains available and carefully carried out, may be given as the Canadian programme.

The Harbour Terminal at the Head of the Lakes has been carefully and wisely located. Government, corporate, municipal and private interests have evolved, in 30 years, splendid harbours, magnificent railway terminals, flourishing cities, and successful enterprises. The "Head of the Lakes" has no competitor. If it had a rival, would Port authorities, whose knowledge results from ascertained facts relative to economic transportation, ask the questions:

Why two adjoining city organizations ?

Why two ports ?

Why three independent railway harbour terminals ?

Why twenty-three independent terminal elevators ?

Why nineteen terminal elevators served by only one railway ?

Why flour mills served by only one railway ?

Why the Harvesting Company's assembling plant served by only one railway ?

Who stands the economic loss due to lack of co-operation ?

Who stands the loss due to duplication ?

The "Head of the Lakes" in Canada may continue to hold its situation without a rival. A combination by the three railway companies, resulting in a large joint

railway, elevator and harbour terminal, for the economical and speedy transfer of grain from rail to vessels for shipment to storage elevators at eastern lake ports, is a possibility which should be made unnecessary of consideration.

THE UPPER LAKES SERVICE.

From the Head of the Lakes, further transportation eastward brings in the all-important question of whether the route will continue through Canadian Ports or whether the business will be diverted to the United States. The owner of the grain is not expected to be controlled by sentiment. The route by which he receives best and surest profits is chosen.

National or State policy is another matter. Actual economy of transport, so as to increase the price to the producer or cheapen it to the consumer, is a point well taken with statesmen. Much more are the tolls on commerce of interest to a people and its legislators. All along the line, every station, every town, as well as every port or terminal, reaps the reward.

Therefore the chief point to Canada to increase the business through the ports is the effort to make such a route as will compete with the main Buffalo-New York route. It were well worth while even at a sacrifice. The great State of New York is setting the example.

Can engineers design and construct a route, and operators achieve costs to meet the competition? This is the most important commercial question in Canada to-day.

PORT COLBORNE.

Port Colborne, from a point of distance, is equal to Buffalo. From this port to Montreal, by the St. Lawrence Canal System, the present water route is far and away

ahead of the nearly completed Barge Canal to New York. Port Colborne, however, for Winter business is out of it.

Port Colborne Harbour is the Lake Erie entrance to the present 2,500 ton Welland Canal. The necessary entrance to the canal made an excellent ready-made harbour with the addition of a landing quay, an elevator and a railway terminal.

From Port Colborne to an Atlantic Ocean port the distance by 2,500 ton vessels is only 369 miles.

Buffalo to New York, by the 1,500 ton Barge Canal, is 497 miles.

For canal navigation, the seasons being equal by either route, Port Colborne to Montreal has much the best of it.

But there the advantage ends. Port Colborne has one modern transfer elevator, and a very excellent one, belonging to the Government of Canada. The storage capacity is 2,000,000 bushels. It can unload grain from the largest sized lake vessels and has every facility for dispatch. There is also the Maple Leaf Milling Co.'s elevator, with a capacity of 1,500,000 bushels.

Buffalo, on the other hand, has sixteen elevators, with a capacity of some 18,000,000 bushels. At the close of navigation, grain stored in elevator or vessel at Buffalo has the Winter market advantage and the cheap rail route to New York. Anything stored in Port Colborne is at a competitive disadvantage.

The Welland Canal from Lake Erie to Lake Ontario is however in process of enlargement. A year or so after the completion of the 1,500 ton New York Barge Canal, the New Welland will pass the 10,000 ton lake vessel, which then will have a clear run to Prescott.

Prescott is only 119 miles from Montreal. Lighterage from Prescott to ocean vessels in Montreal Harbour will

be almost as cheap as from the New York State Canal terminals to the ship, and Prescott elevators will be within order distance when vessels require grain. For grain at Prescott, no Atlantic port can compete with Montreal in Summer, and grain in a large storage elevator at Prescott will also be in an excellent position for shipment in Winter via St. John or Halifax.

The Georgian Bay Canal project, or the completion of the Ship Canal between Prescott and Montreal, is a subject in itself.

LAKE AND RAIL.

John R. Booth, an Ottawa lumberman, was the first to appreciate and willing to back "Lake and Rail" as a Canadian economic grain route. He built a railroad from Depot Harbour, through Ottawa to Coteau, near Montreal, and constructed elevators and freight sheds at the terminals. His route, now owned and operated by the Grand Trunk Railway System, is the shortest, both by lake and by rail, but the railway has "grades." The Depot Harbour route runs over the height of land and the Grand Trunk Railway has completed another line, via the Peterboro watershed from Midland to Montreal, as a grain route.

At Midland the Grand Trunk Railway has developed its Railway Lake Terminal. The natural advantages for a harbour here are many as compared with an exposed lake situation like Buffalo.

MIDLAND HARBOUR (TIFFIN).

Midland Harbour is situated on Midland Bay, the most eastern indentation of Georgian Bay. The town, including the terminals, has a population of about 5,000. The only railroad serving Midland is the Grand Trunk.

The town has extensive lumber mills, coal docks, freight

sheds, steel works and other prosperous industries. The original Harbour is close to the town in the southern arm of the bay, while the new grain warehouse terminals are situated on the eastern arm. The shelter throughout the harbour is excellent, and loading and discharging are carried on under most favorable conditions. As Winter quarters for vessels, both loaded and otherwise, the Harbour offers special attractions as to safety and for the shipment of grain.

The entrance to the Harbour is favourable from a navigation point of view. The depth of water is ample and there are no difficulties of a bar, as in many harbours on the Great Lakes.

The new railway terminals are situated at Tiffin, a suburb of the town of Midland. These consist of extensive sidings, modern docks for deep water berths, warehouses and grain elevators.

The elevator facilities at Midland are as follows:

Midland Elevator Co.'s elevator. Capacity, 1,000,000 bushels. Wooden structure, iron sheeted. Capacity from vessel, 10,000 bushels per hour. Depth of water, 22 feet.

Aberdeen Elevator. Capacity, 1,000,000 bushels. Iron structure. Capacity from vessel 10,000 bushels per hour. Depth of water, 25 feet.

Grand Trunk Railway Elevator. Capacity 2,400,000 bushels. Concrete structure. Capacity from vessel, by two travelling marine legs, 24,000 bushels per hour. Depth of water 25 feet.

For future extensions the plans call for several additional units. During the twelve months ending July 31st, 1916, 29,500,000 bushels of grain passed through this Port.

PORT McNICOLL.

Port McNicoll Harbour is also on the most easterly point of the Georgian Bay. The Harbour was formerly called Victoria Harbour.

The distance from Midland Harbour Terminals is about $2\frac{3}{4}$ miles.

This is the Canadian Pacific Railway grain terminal on the Georgian Bay, connecting with their railway grain route to Montreal. The company has extensive machine shops and a large round house at this point.

The population of Port McNicoll, together with Victoria Harbour, is about 2,000.

The Canadian Pacific Railway Company has built at this place deep water wharves for about eleven vessels and also a large freight shed, 700 feet long, and a flour shed, 800 feet long. The type of construction of the wharves varies considerably. The portion in front of the elevator is of solid concrete; another portion is of concrete superstructure on concrete cribs and a further portion of concrete superstructure on timber cribs.

The scheme proposed by the Canadian Pacific Railway Company for this grain terminal is a very complete and comprehensive one. It is designed as a lake terminal of the most permanent and up-to-date type and every care was taken to plan the work to suit this end and to take every advantage of the natural features of the site.

The important pier, taking in Maple Island, is designed to be 3,000 feet long and 650 feet wide. The northwest face for the whole length has been completed and the first two units of the elevator with two marine legs, power house and tracks, sheds and complete railway terminals built and put into operation.

The scheme includes four additional units of 2,000,000 bushels capacity each, and the completion of the south-east face of the pier.

For an elevator system, economical, quick handling, large storage capacity, splendid railway terminals, permanent, and capacity for future extension, Port authorities would do well to watch this important development.

During the twelve months ending July 31st, 1916, 34,300,000 bushels of grain passed through this Port.

Adjoining the grain pier is a basin 600 feet wide and 25 feet deep. The bulkhead wharf on the opposite side of the basin is 3,500 feet long. On this, besides the railway terminals, flour shed and freight shed, there is a passenger station for connecting the upper lake service with the Canadian Pacific Railway.

Midland Bay, on which the Harbours of Midland and Port McNicoll are situated, has an excellent reputation as to weather, fogs and ice conditions. They have never known ice shoves in the Harbours, and dredging, after excavation has been done, is not required.

These two Harbours, situated on the water-front, almost adjoining, are very high class examples of lake terminals. It is expected that large storage additions will be added to the elevators with the idea of shipping as much of the Summer's crop as possible across the lake before the navigation season is closed for the Winter. The elevators are the most perfect examples of design and construction for efficient working, cheap insurance and careful handling.

The regular business capacity of the elevators at each of the railway terminals is receiving from vessels, storing and shipping by railway cars at the rate of from 300,000 to 400,000 bushels per day.

LAKE PORTS TO OCEAN PORTS.

During the open season of navigation, from May 1st to the end of November, the grain is shipped by Canadian Pacific Railway to Montreal and, by Grand Trunk Railway, partially to Montreal and partially to Portland.

There is a great advantage in grain storage at Georgian Bay locations. The distance is from 360 to 400 miles from Montreal, so that regular shipments may be made at lake elevators as required at Montreal. The two systems at Montreal and Georgian Bay regularly take care of each other's business.

The railway routes from Georgian Bay ports to Midland and Port McNicoll to Montreal are excellent for solid, heavy grain trains. These ports also furnish Winter business for the roads in question for their Winter ports at Portland, Maine, and St. John, N.B.

The Grand Trunk Railway also has a grain route via Depot Harbour, Ottawa and Montreal. This route is the shortest of all lake and rail routes. The harbour at Parry Sound is excellent, but as the railway runs over the height of land, the grades are not so favourable for heavy grain loads.

GEORGIAN BAY PORTS.

The almost adjoining Port Terminals on the Georgian Bay, two units giving every known modern type of perfection, are open to the same criticism of Port authorities as the Twin Ports at the Head of the Lakes.

The two large modern elevators in Montreal Harbour, Nos. 1 and 2, working as one unit, are showing economic advantages worthy of note, but probably the best features are the one organization, the one operating railway terminal and the combination of two stores capable of

being drawn upon to complete orders as required. The result is despatch, economy and general satisfaction.

Port authorities may well study the question, with a view of some remedy, for the general non-economic UNIT SYSTEM OF RAILWAY PORT TERMINALS.

FRIDAY, SEPTEMBER 15, 1916.

MR. ROSS—Gentlemen, Mr. Cowie's paper is open for discussion or questions.

MR. W. S. DAVIDSON, Vice-President Board of Trade, Halifax, N.S.—I wish to thank the officers of the Association for the privilege of letting a representative of the Halifax Board of Trade attend the conference. Why Halifax is not in the Association I cannot say, but I am taking information back as to what you do, and next year Halifax will be here if you will have Halifax as a member. I wish to congratulate Mr. Cowie on his paper on "Canadian Ports." I am interested particularly in the development at the port of Halifax. On Sunday last I went over the work under construction with a gentleman from New York. It is a gigantic thing, and wonders have been accomplished since the work commenced. I remember it as a boy, and seeing it now, the development is simply wonderful. I think that Mr. Cowie has gone into the thing so thoroughly that it is evident that some of the difficulties and troubles talked about here are eliminated in his project whereby freight is brought alongside the steamers and the cars go on the piers, switching back and forth, and a lot of terminal expenses are avoided in that way.

MR. MEIGS—Mr. Chairman, Mr. Cowie advanced an idea with regard to the two ports of Fort William and Port Arthur, in reference to unnecessary duplication of facilities

at these ports, which is one worthy of careful consideration. Manifestly such duplication of facilities is uneconomic in the extreme unless there is sufficient business to warrant such duplication of expenses, and it is a question whether it would not be within the legitimate sphere of the activities of this Association to pay some attention to the matter of the advisability of the expenditure of Government funds indiscriminately for the improvement of harbours which are, to a very large extent, superfluous on account of their near proximity to other harbours which can be improved at lesser expense and which form more perfect and economical points of transfer. It is better in such circumstances to spend the money on one harbour best fitted than to equip in a less perfect manner two harbours for work which could be handled best by one of them. It means duplication of all sets of facilities, wharves, mechanical equipment, railroad connections, railroad yards, and an infinity of minor but expensive facilities of all kinds. That opens up a very large subject, and one, of course, which would meet with bitter opposition from the localities affected. I would be interested to hear what other members present think of the matter, and whether or not it would be worth while to develop the matter any further, or whether it would be better to drop it for the time being.

MR. SMITH—The point raised by Mr. Meigs is a splendid one, and we should talk of it now. Mr. Cowie's paper brought out one point in particular which has a bearing on what Mr. Meigs has said, especially with regard to Montreal port, and that was the necessity of laying out the port along the right lines. Too frequently in answer to public opinion that something should be done, men go ahead and lay out ports in such a way that it is impossible to expect the ports to be self-sustaining, or profit-

able in any way. There is an illustration in Boston where they built those piers. Mr. McSweeney, in discussing them, laid emphasis on the necessity for a comprehensive plan. On the New Jersey side at Newark, in the anxiety to do something, millions of dollars have been spent already, and it looks as though the money has been wasted. A number of more millions will be needed before it can be brought into service, and it is a question if it is adapted for trade purposes. They started on the theory that if they had a wharf which would accommodate ocean business they would get the business, but they overlook the fact that business seeks a centre, and that it will not go into the outlying districts until the congested centres have been occupied. It will be many years before those wharves at Newark will come into use. One of the most important duties of this association is the education of state officials and other governing bodies to the necessity of carrying on port developments along the best lines and to see that they get the best advice when they do propose. When the new commission was appointed here for port organization, before they began reconstructing the port they spent many years in studying other ports, and before adopting the plans the most eminent engineers were consulted, and the results are shown by what you are accomplishing here. It struck me yesterday that Mr. Cowie's paper gave the key-note to this question. Why should there be this duplication in the two cities of Fort William and Port Arthur? Why should there not be a union of service as in Montreal which ties up all the docks and operates them as one? In New Jersey, particularly, one portion of the port is a dead end for a great number of railroads. There they go to the wharf frontage, and there is no method of intercommunication.

Strange as it may seem, railroad cars coming into the lower part of Jersey City to the Lehigh tracks go into the hinterland nearly 100 miles at great cost in order to get to the Lackawanna tracks, which are just one mile away in Jersey City. That seems nonsense. The public is paying for all this duplication. We cannot blame the public. The public does not know. This matter of terminal facilities and the efficiency of the port is a life-long study and it requires continuity of service in order to accomplish anything. An association of this kind can do a great deal of educational work, work of tremendous value. Mr. Meigs points out that some ports and cities won't like it. Naturally they won't, but we are agreed that ports do not serve the particular locality where they are located but serve the great hinterland. Galveston has a great tonnage through the port, and yet little or none of it is for the city itself. Galveston has the largest amount of export tonnage of any port in the United States, yet Galveston reaps no benefit. Mr. Bridges brought out a point in his paper yesterday in this connection, and that was the point that railroads will not favour a port. It just happens that at Galveston we are interested in a mill, and yet we cannot get frequent use of the Southern Pacific Line, an American line running from the port of Galveston to New York. They have so much through freight that they cannot accommodate local freight. They are interested in rails, and want the rail haul. That brings the thought of the need for the co-ordination of rail and water facilities under Government supervision so that a city located on the water-front can get the benefit of the industrial life that would abound if this were done, and if the railroads could be compelled to operate a transit

service giving proper accommodation to business originating in the seaport town.

It might be interesting to you to know what we have done in New Jersey where we have so much riparian frontage, and where the water frontage is dominated very largely by the railroad interest. Up to five or six years ago, notwithstanding the fact that New Jersey is practically surrounded by water, there was no government body in charge of the water-front. President Wilson, then Governor of New Jersey, realizing that it was not right that we should have that tremendous water frontage and nobody in control, had an investigation made into the conditions. I review this to show that even when a body has no power, the fact that it represents the State and is in a position to render services enables it to do lots of things. You do not have to have legal power to accomplish objects. This was a commission to investigate. At the outset a matter came up, affecting the pierhead lines of the Hudson River. The United States Army Engineers, who have final say in fixing these lines, desired to change them, and they didn't want to take the odium which would go with that change. It would mean cutting off the ends of the piers and affecting the Jersey side of the river. They asked us if we would give them a hearing. Naturally, that was detrimental to New Jersey, and we did not care to do it, but we thought it good policy to cater to the wishes of the engineers. This was challenged by the railroads, who threatened us with a penal suit with all the damages that would be put on them. They made a great tirade against us, but when they found out the army engineers were behind the matter and that they were powerless, that the United States Government had full power to change the pierhead lines, they turned

right-about-face, and they came to us and said, "Won't you help us?" Then they placed their entire case in our hands, leaving us to fight their battles for them. We won out and saved them their piers. That brought about an entire change of attitude. They realized the great value of having an intermediary who would protect as well as censure them if they were in the wrong. That pointed out to us a way of controlling the railroad domination of the water front; that is, by harmony and co-operation with the railroad interests. With that principle we have got increasing power. As a result of our study and having some plan for the future, we have put on the statute books and invested in our Board the supervision of the water frontage so that no change in piers or frontage can take place without permission from the Board. That gives us control over the municipalities like Jersey City. Our Board is the last resort for them. We can control water frontage development, check any unwise expenses as far as our State is concerned, and we think that as a result of our study of other ports in the United States and of Montreal in Canada that we have checked this unwise expenditure. Unfortunately we were not in existence when Newark undertook its development. If we had been, an uneconomical laying out of a pier would have been avoided.

It has been striking me throughout these discussions that if this Association could only find some means or methods to educate the public at large as to the necessity of control over the development of the water-front, it would be a good thing. Take Mr. Cowie's paper going into the layout of Montreal, Halifax and lake ports, pointing out the different mistakes of the past, showing how in these cities some of them have been

avoided—if these papers could be circulated throughout our seaboard cities I think it would be a great power for good. There is no work which would be of more value than that of educating the public on these things. In Montreal where they have a unique situation, where they have control of the water frontage with a belt line railroad, where they own the water front and control the entire system, I think we can get a splendid illustration of the highest type of port development. I know that in our State we have profited a lot from it. You have different problems here from what we have. One of the great problems with us is the railroad situation and the switching charge. In this connection it would be of interest to the Association to hear of the case which our Board is pressing before the Interstate Commerce Commission to do away with the discrimination which exists against New Jersey in the port of New York. The reason I say it will be of interest is because we feel that it will revolutionize the basis of rate structure in the States, and undoubtedly that will reach into Canada, because the two countries so far as railroad rates and regulations are concerned are more or less inter-laced and inter-linked. We think there will be a terminal charge. The railroad rate will end at the terminal, and after that there will be a different charge. Probably it is not wise to do away with the zone system, but it will have a modifying effect on the present arrangement, and I would suggest that you watch proceedings before the Interstate Commerce Commission. Anything which will bring before the people the fact that the terminal is the crux of the transportation situation will do much to solve our problems. If we could discuss Mr. Cowie's paper from the point of view of policy and the effect it has on ports at

large, the proper planning of the port layout to give a port the right start—if you start right you can extend indefinitely—it would be valuable.

MR. RAY KNIGHT, City Engineer, Fort William, Ontario—I would like to make a few remarks about our Harbour. There is one matter I will speak of before going into the question of inter-switching charges, and that is the question of the foreshore rights. As I understand it, Canada has no practical rights over the foreshore in a number of instances. This does not obtain on the waterfronts of the Great Lakes as far as I remember.

MR. ROSS—I think it does from the high-water mark.

MR. KNIGHT—It did, but I think these rights have been given away. I am speaking from the Fort William standpoint. There was a range of 66 feet right along all the front of the lake, but subsequent to that and before these rights were given up they sold the water lots extending between 1,600 and 1,700 feet into the lake, isolating that 66-foot strip and making it of no value as a foreshore property. As far as the terminal facilities of Fort William are concerned, it is my duty to take back a message from this meeting to enlighten our people as much as possible on the efforts that are being made to bring the railway companies in line with harbour requirements. We have a commission at the present time, that is the Grain Commission, sitting on this question of inter-terminal switching rates. At Fort William we are in the unique position of having three trans-continental railroads crossing at one time within fifty feet of each other. At this point it would seem that there would be a logical and easily arranged proposition for laying out a combined terminal switching yard. Added to this we are interested in Fort William in what we call the sample market. This

sample market is at present located in Winnipeg. The grain is shipped from Winnipeg on sample. Instead of the ordinary wheat train the grain comes down on nothing but a mixed freight train, because the different grades of grain come in for different elevators. These different elevators are probably situated on different companies' lines. That means that there is some switching to do in Fort William, which is to be paid for in unequal proportions according to the points of shipment and the points of destination. Fort William formed a company which took over the terminal facilities, but unfortunately they did not see far enough ahead, and for a mere pittance surrendered these facilities to the Canadian Pacific Railway when they developed terminals there. We must start afresh in order to get terminal facilities throughout the port. The question before the city just now is to foster between the different authorities either an idea of nationalization of railroads to control this situation or an inter-switching proposition in Fort William. We have 26 miles of river frontage in Fort William, but the majority of this frontage is not available. For instance, referring to Mr. Cowie's map, the whole of that island is C.P.R. territory, served by a railroad which goes across here off the C.P.R. on to that island. The whole of this river front to the point about there is dominated by the Canadian Pacific Railway, which runs along the edge of the water front. The whole of this territory on the other side of the river is for the Grand Trunk Pacific, 1,500 acres having been given that company as a bonus to get it into the town. That is now the Canadian Government Railway. They have splendid harbour facilities there. It leaves the development to private enterprise. This section is served by three railways. This island, dominated by the Cana-

dian Pacific, is the only one having access to it. When we get an elevator that wishes to locate at Fort William they ask for two railroads at least, so as to be independent of any hold-up from embargoes placed on cars. There will be another 200 acres available at this end of the town to meet these requirements. Fort William is in an awkward predicament so far as having development until some control of harbour facilities is gained. The duplication of facilities is the trouble. It is really a triplication of switching because of the three railways, the Canadian Pacific Railway, the Canadian Government Railways and the Canadian Northern Railroad. The Canadian Northern terminal is in Port Arthur, and that is a point of disagreement between the two towns. They fought and fought the different roads going into Fort William for a passenger station. Here is the logical situation for terminal yards which would be a sample market for grain purposes. Grain could come down and be made into trains for the different elevators, and it would save all these inter-switching charges if terminal facilities could be had. Before I retire I would like to express my appreciation of the invitation to be present here. I can take back a message of hope that we are all agreed that we should be working on joint terminal lines.

MR. S. P. BROWN, Chief Engineer, Mount Royal Tunnel Co.—I am not a port authority, and I do not pretend to know very much about harbour matters, but I am interested in terminal development, and I was enormously interested in Mr. Cowie's article. It is one of the most valuable ones coming out in any organization for some time. I am not going to attempt to criticize it. I would not have the impertinence to do that, but I feel that in what he said about Fort William, Port Arthur and

so forth, that possibly we might go back a little further, and see the reasons for these duplications, those which he took as a sample and those which are in nearly every city in the United States and Canada. We have just had it explained about Fort William and Port Arthur very well. The old road came in there first. Then the second road came in and took what was left. The Canadian Northern came along later, and there wasn't any course left but to go to the next best place. Take Montreal. When the Canadian Northern wanted to get into Montreal the Grand Trunk and the C.P.R. really had a monopoly of the total entrances on the surface. There was no way that the Canadian Northern could get in and retain any individuality, which, unfortunately, up to now has been the battle-cry of railways. They insist that each requires a strategic advantage over the other if such can be gained, and there has not been the get-together movement which must come if the railroads are to live. The Canadian Northern did this, however. They came through the mountain on a very direct line, and they have located in such a position that a combination can be formed, that unification could be formed with the other railways without serious difficulty and also to get the connection with the harbours and with the Eastern lines that was possible in Montreal. But what I say of the get-together movement I feel is a matter which is coming, and has got to come pretty soon. The railways now, especially in the States, have been feeling more and more throttled, more and more brow-beaten, and they keep requiring increases of freight rates and Government assistance of various kinds. As a matter of fact, I think, and I think I voice the general railway feeling, that is, inside themselves, that they realize that the trouble is mainly with them-

selves. They do not play the game together. They have not attempted to play it. Each one is fighting the other. Until they do, all the commissions and Government commissions will not play ball with them. You have great terminals with multiplication of facilities. You cannot say, "We will lay out a comprehensive port plan" of a city already laid out and developed. All you can do is to make the best of a bad job until as the years go by great changes can be made. I think that of all the important features of port development as far as the railroads are concerned the belt line or marginal railroad that connects the various terminals together is probably the most valuable and the most important, and that is something which, as Mr. Smith says, must come from the people and be the result of education and the get-together movement of the railways themselves. I cannot help thinking that, while there are cases, as Mr. Smith said, where they laid out their plans comprehensively but unfortunately got it wrong, it is well where you can to lay out as Montreal did many, many years ago with great foresightedness a comprehensive harbour layout; but, while you have your port in operation and your terminals built—the terminals which have grown up gradually in an atmosphere of intense competition and individuality—it is best to make the best of the existing situation, which is nothing but to get a number of lines of terminal railways which will unite the through railroads and reduce the transfer charges, which exceed the actual transportation of goods coming into the various terminals.

MR. TOMKINS, New York—I would like to ask Mr. Cowie how it is that with the exception of Port Arthur and Fort William, which seems to be the only clear example of port deficiency in Canada, that it has been so easy

to bring railroads into concerted action in other Canadian ports.

MR. COWIE—I think you have assumed a condition in other ports which is not right. On the other side of the lake we have exactly the same situation. The Grand Trunk and the C.P.R. operate within sight of each other on a unit system, neither connecting with each other. I treat of this in my paper, but I did not read it. It will be printed, however.

MR. TOMKINS—Still, it is a fact that the railroads co-operate generally at most Canadian ports and do not in the United States. Why should they do it to such an extent here? With us the only exceptions are San Francisco and New Orleans. In other words, you are further along the line to correct organization than we are. Does the Canadian Government control the railroad policy more than we do, or is there a greater appreciation of the methods of correct port development than exists in the United States? Or have the railroads come later in Canada than with us, and that therefore you do not have the problems of reconstruction to meet which we have, because the construction has been done right in the first place?

MR. ROSS—I think the Great Lakes are different from most other ports in Canada because they are newer. Some of them are of recent origin, built up entirely because the Grand Trunk or the C.P.R. bring their grain down to them, but they are not designed for the general business of ports. It is in many cases special grain business. The Canadian Pacific Railway developed Fort William and brought the grain there to trans-ship to lake steamers, and then the Grand Trunk and Canadian Northern followed

them. So conditions are different in these ports because they are special ports for special business.

MR. TOMKINS—They are really private ports for handling special products.

MR. ROSS—Bulk products. The great business is grain handling. They handle the same business in Port Arthur and Fort William as in Montreal, but here the tracks were built by the Harbour Commissioners, and we control the whole water front. After they were built, for a time they were turned over to the railroads; but, as I mentioned the first day, the Harbour Commissioners took the operation of them back into their own hands in 1908, and have operated them since.

MR. SANFORD EVANS, Chairman, Georgian Bay Canal Commission—I rise with a great deal of hesitation because I am not a port authority and know very little indeed about the organization and management of ports. I rise to say that I was very deeply interested in the discussion this morning. I have had occasion during recent months to conduct some investigations into the transportation problem of Canada, and that has, of course, brought me in touch with certain aspects of problems relating to exports and imports. During the papers discussed this morning, and also during recent weeks, it has occurred to me that the problem of ports has many sides, but this morning one of the important things was the growing up of a comprehensive plan of a port.

MR. MEIGS—The analogy between the harbour lines and the marginal avenue and the numerous streets of a comprehensive layout for towns is nearly complete, and I think the laying out of the harbour lines and the general marginal streets and the belt line railroad is about as far as most port authorities feel they are able to go with any

remote possibility of their plans being carried out, unless there is money in sight for the construction of specific facilities or wharves. Comprehensive plans have been made and elaborate studies of what should be done. They have educated the people, but no practical results of a size commensurate with the labour put on them has appeared, but it is the hope that it will appear in the course of time. In Mr. Ross's paper yesterday there was some question in relation to the status of the riparian frontage here and the manner in which it was acquired and the exact jurisdiction of the Harbour Board, and it was suggested to me that Major David Seath, Secretary of the Port of Montreal, is more familiar with that subject than any man in the Dominion of Canada. He has been connected with the port so many years that the memory of man runneth not to the contrary. If Mr. Seath will favour us with a brief explanation I am sure we will all be glad to hear it.

MAJOR SEATH—I will quote here from the Act of March 30th, 1640.

There was an understanding that there should be 120 ft. reserved along the shore for the purposes of navigation to serve for passage and traffic. It was found that this roadway of 120 ft. often in the spring or fall of the year was impassable, and too wide to be maintained. By order of one of the Intendants the road was cut off and the ordinary roadway of commerce of 36 ft. was taken further back off the ceded lands and the proprietors of the lands adjoining were given up to the high water mark. That high water mark is the ordinary high water mark of the River St. Lawrence, and it was enacted by the Act of 1855 that that should be the boundary of the harbour of Montreal. When the Commissioners were given this territory down to Longue Pointe they had surveyed what

was called the ordinary high water mark, and then entered into an agreement with the proprietors fixing a boundary line by *procès-verbal*. The proprietors of the lands adjoining and the Harbour Commissioners entered into agreements which fixed the line between the harbour and the adjoining property. When there was disagreement it was provided that action should be taken *en bornage*. The Court hears the matter and all the discussion of the experts as to where the line should be laid and gives a judgment fixing where the boundary line should be and the judgment stands. The harbour has been very lucky in getting hold of this land as far as they have gone. The cost of actions *en bornage* is borne half by each proprietor. There have not been many kicks. There was an action with the Grand Trunk Railway about the Victoria Bridge. The Court appointed an expert to lay out the boundary line, which was fixed by a commission of three. That boundary line was formed by the port. They took it to Appeal and lost it in Appeal and took it to the Privy Council, and when the lawyers were leaving for England they made their decision, and the boundary lines are as they are. We had no trouble at all in getting that. This whole shore line dates back to 1640, when it was given to the Society of New France, who transferred it over to the Seminary of St. Sulpice. That power has always remained that gives the power of administration and control.

MR. TOMKINS—Were there any attempts made to alienate any of it?

MAJOR SEATH—Sometimes they would try to take it. The law was against them, however. Sometimes a man tries to build a private wharf and we tell him to get off. That is the end of it. None of this foreshore has cost the

Commissioners a cent. That is why we can do more in Montreal with less money than other ports.

MR. TOMKINS—To supplement what Mr. Smith said I would like to say a word further to you. There are two other reasons for New York's supremacy in transportation on the Atlantic Coast. One is the fact that it is not only the greatest seaport, but the greatest manufacturing city and district in the United States. One-tenth in value of the manufactures of the country are produced in New York. One-eighth in value of the manufactures of the United States are produced in a district within twenty miles around New York. Back of New York, back of the Great Lakes, there is a great string of manufacturing cities for which New York acts as an exporting agent. One after another railroads have been diverted to New York to take advantage of the service provided there and the ocean port system established there. This manufacturing port is of vital importance to every city because it is able to take advantage of its opportunities. The port makes the city and, in the reception and export of raw materials and finished products, it offers an opportunity for a great city, and New York is taking advantage of that.

MR. SANFORD EVANS—I hesitate to occupy even a moment or two, but I should like again to say how much I have been interested and benefited by the discussion. I should like to say also that the present position and the possibilities for good of this organization have been growing upon me as the hours of this Convention have gone by. It appears to me now that in the spirit just shown by Mr. McSweeney and all the other members that a very great amount of good to both countries can be accomplished. I have been interested in examining some features of the

routing of Canadian traffic, and I have risen to venture to state one or two general conditions which may be of interest to all of the ports. It has seemed to me, sir, that in respect to the port of export, United States and Canada are more closely connected than in any other respect whatever. A large proportion of the bulk traffic for export originates in central parts, our central district being north of yours. The port of Montreal is practically as convenient to that district of the United States as are the ports of Boston, New York, Baltimore and Philadelphia. On the other hand these American ports are practically, as far as geography is concerned, as convenient to our commerce as is the port of Montreal. There are a few formalities if goods are sent through in bond, but it only means that, from the original starting point, the direction shall be changed a fraction of a degree and this product can reach any of these ports. In 1913, when I made a special study of Canadian wheat export traffic, two-thirds of our Canadian export wheat went from the ports of Portland and those other ports which I have mentioned, and the other one-third went from Montreal and St. John and Halifax. Every year a large proportion goes out through United States ports. I was interested as a mere layman in trying to understand why under existing conditions that is so. I could not discover from a cursory examination any deficiency in handling efficiency in the port of Montreal to account for the diversion. I could not find the water communication of Montreal and the St. Lawrence gateway were over-burdened. It was evident that the railroad lines across Southern Ontario had not been over-taxed for that season. I found also that Canadian shipping on the Lakes had handled a volume of traffic very much greater than the port of Montreal had exported.

On account of the coasting laws, after you load an American vessel at Fort William it must report at an American port on the Lake. The Canadian Lakes handled two and a half times each month what Montreal handled in the month. So there was no deficiency in lake transport. I then examined the freight rates by checking out the special tariffs, and I could not find the time when the transportation companies were not prepared to quote a lower rate than was quoted to New York, Baltimore, Boston and Philadelphia. Why, then, did this go out of American ports? It was necessary then to examine the conditions on the ocean, and the conditions on which the grain was started, and the conditions of purchase at the other end. I discovered a very important fact, and this may be of interest to every port authority. In the first place I found that Europe bought week by week. It does not matter how much you order, Europe will only take for delivery in a certain time about to the consumption requirements of that time for Europe. Europe has never entirely departed from that principle. It could not economically depart widely from it. If Europe attempted to get in two or three months or a year's supply of wheat at once, you would throw a load on ocean shipping that the extreme fluctuations in the freight rate would render uneconomical. That is the first consideration. The second condition is that the United States and Canada do not export wheat to Europe but that Europe imports wheat from Canada and the United States. Our exporters cannot get into the European market to do trade there. They sell to that market. It is true that on long voyages such as those from the Argentine, wheat is sometimes started for Europe before it is sold, but there is very little wheat started from South America which is not sold before it is

shipped. I could show you how the European markets have simply squeezed the shipper who owned cargoes arriving on the shipper's account. If the European market has purchased for delivery in any particular period so much United States wheat and so much Canadian wheat, there is, as far as I can discover, no conflict, no crowding between your wheat and our wheat when it gets to the sea-board. That results if they have bought your wheat because it suits them better in price or quality, or whatever it may be, and may not have bought as much of ours, your wheat will use the facilities of the port of Montreal. In 1915, this port handled more American wheat than Canadian wheat. Our crop was short. They bought yours. It depends on what wheat they have bought, and there is therefore no real crowding. I found another condition prevailing along the North Atlantic as well, and that was the liner dominated the wheat traffic of the North Atlantic. I checked out the ships' manifests for the ports of Montreal, St. John and Halifax for three years, and I found that between 50 and 60 per cent of all grain exported was exported in passenger boats and for three years only five per cent in tramp boats, and the rest in cargo liners. The liner has dominated the North Atlantic and has for fifteen years absolutely dominated it north of Philadelphia and Baltimore. Philadelphia and Baltimore have had tramps to a considerable extent. Boston handled in recent years, and New York between 1903 and 1911, a very insignificant tramp accommodation. Now, these liners are distributed apparently up and down this coast in proportion to the loading factor in the North Atlantic. I found that through our Canadian ports we had imported in the fiscal year of 1913, over 93 per cent of all our imports for ourselves. We had imported a

considerable amount for the United States, for transit through our ports, probably sufficient to over-balance that six per cent. Our boats from Montreal carried a little less than 50 tons here for every 100 tons they loaded out. I would like here to emphasize the importance of statistics of freight tonnage in and out of a port. Gentlemen, it is how full the ship is, how much bulk there is to carry, which determines the distribution of shipping. If you take South Africa, which exports diamonds and ostrich feathers, which can be put in the purser's care, they will have a serious problem until they amplify it with something else. It is the cargo tonnage which brings boats and shipping. We cannot get the statistics of tons carried. I have tried to get it. I think that is largely underlying the whole question as to distribution between ports of your export and import traffic. Take the Atlantic Transport line for the year I took, when they carried 10,560 tons of cargo on a round voyage a little less than 5,000 tons of that was loaded out. If we could get the passenger load loaded out, I believe that we would find that the same load factor exists all over the Atlantic. That is, we are taking the same steamship lines which has a service to all the principal ports. They cannot load out more than one hundred per cent at any port. If we could only get 150 per cent of a load coming in to Montreal, and get 75 per cent of a load going to New York, that would get it on the Montreal route. Shipping is distributed in proportion to that load factor now. We apparently, all up and down this coast, are subject to the little, simple economic balance of the load factor. It is the great object of the Canadian people to create greater traffic through our own ports. At the present time, if we bring in too much shipping here, the incoming

freight is distributed over a greater number of vessels, and if we destroy the balance of the load factor up and down the North Atlantic, inasmuch as it is not in as good a position to make a rate out as the liners and vessels having a more satisfactory load in, they cannot economically take the liner rate out. I ventured to suggest this because it seemed to me that all our ports, and in a peculiar way all the ports of North America, are subject to the same simple, general, economic conditions. It is the one transportation problem for both countries when we meet the ocean, and the liners seem to get first call on the export business here. The liners make a somewhat lower rate to carry the wheat than the tramps do. The tramps frequent only the sure field because the liners under-bid them. When the liners do not bid any longer for the traffic the tramps come in. As a rule they go in first to Philadelphia or Baltimore because that is the centre of the Atlantic Range which is the basis of all tramp quotations, and because of better bunker coal provisions, and also because you have got your vessel advertised to those ports. If the tramp will make the same rate to Europe and you can get it from the lakes, or by rail from Chicago at a less cost to Baltimore or Philadelphia than you can to New York and Boston, the shipper will send it that way. Then it is only when the economy of shipping by tramps because of these conditions is met, or some special conditions arise, that we can pay the tramp enough to come all the way around here. The point is we need more information about the loading factor on the ocean, and if there is anything which can be done in the United States to supply the facts of the number of tons which come in as against the number of tons which go out, not only year by year, but the monthly distribution in detail, it seems

to me it would help us to understand this very complicated and important problem. We can supply these figures of tonnage in Canada, not in a good convenient form, but it is collected in Canada, as in few other ports of the world apparently. I am convinced from my study that we cannot explain the facts of our own ports until we can look up these values of your load.

APPENDIX I.

RESOLUTION PROPOSED AT FIFTH ANNUAL MEETING, AMERICAN ASSOCIATION OF PORT AUTHORITIES, SEPTEMBER, 1916

By Mr. McSweeney, of Boston

Whereas, the disposal in Foreign Markets of the surplus products of America, whether of field, factory or mine, is a matter of vital importance to the business progress and advancement of Canada and the United States,

Whereas, through the existing system of private and Corporation control of the waterfront in practically all the Atlantic Seaports, and the failure of these private owners of waterfront to use their facilities co-operatively, and to provide adequate terminal connections, which is the basic factor in co-ordinating port facilities, a condition has arisen by which these Atlantic Ports are deprived of the benefits of their natural advantages; shippers in the vicinity of railroad-controlled ports offering a short haul for export and import, are discriminated against in both service and rates, in favor of the interior shipper offering a long haul; and in many other ways a condition has resulted which impedes the free use of these ports, and will make difficult the development of a sufficient American Merchant Marine, and,

Whereas, it has been demonstrated that under public

control of the waterfronts in such cities as Montreal, New Orleans and San Francisco, a service has resulted which permits expeditious and economic shipside delivery and forwarding of goods from wherever sent, or destined, while at the same time showing a profitable return on investment, but suggesting that the existing difficulty is largely in the railroads owning water terminals, putting their competitive ends before the public need, a policy detrimental to the best interests of railroad and public alike, and,

Whereas, while this organization does not advocate or propose any measure of expropriation it declares that vital needs exist, and believes that in their own interests the railroads should provide the remedy, and if not thus provided within a reasonable time, the public must, with due regard for the equities involved, provide for the ownership and operation of terminals if necessary.

Whereas, the failure of railroads in many ports to provide proper transportation facilities, is unquestioned, it being found in many cases that freight is required to be handled by round about route involving many miles of transportation that would not be required under conditions of direct connection, the Interstate Commerce Commission should investigate and report upon the disadvantages to commerce generally, arising from the existing terminal conditions in most of important shipping centres:

Therefore be it resolved, That the Interstate Commerce Commission be requested thoroughly to inquire into the matter of the separation of rail and terminal accounting, the charge for transportation in any given case to be based on the comparative uniform road cost plus the actual terminal cost pertaining to the particular points of origin and destination, to the end that the cost of administering

terminals for freight or passenger shall be known and the losses on such terminals, now hidden in the general rates, be exposed; so that no locality or individual will be deprived of the benefit of it or his advantages in order that the advantages of another locality or individual may be neutralized.

Be it further resolved, That the Interstate Commerce Commission be urgently requested to investigate the whole matter of terminal accommodation and of terminal charges in their relation to and bearing upon the terminal cost of handling cargo at the respective ports in the United States.

Your Committee after having considered the cordial and appreciated invitations from San Francisco, New York, Providence and Cleveland, beg to report that they are unanimously in favour of holding the next meeting in Cleveland, since the Association has had meetings on the east and west coasts, on the gulf coast and in Canada, and a meeting in Cleveland will afford its members an excellent opportunity of seeing the many improvements of the Lake Ports and becoming familiar with this type of port work and administration.

The chairman of the Nomination Committee named Mr. W. G. Ross, of Montreal, to be President of the Association for 1917, and amid loud applause the motion was unanimously carried.

Mr. Calvin Tomkins, in paying tribute to Mr. Ross's work as Vice-President in the past, stated that he felt that it was peculiarly fit and proper that a Canadian should be elected to the presidency, **and moreover that that Canadian should be the executive head of the finest harbour—without exception—on the North American continent, and possibly in the world.**

Montreal was pre-eminent in its administration, its methods and its wonderfully systemized harbour facilities.

Opportunities for development after the war were referred to by Mr. Tomkins, who said that a wonderful opportunity was before Canada, as it had been before the United States after the Civil War. In the United States, the problem was to organize the development it had achieved, but in Canada it was still a pioneering problem to utilize the vast resources, and many Americans were helping in the pioneering.

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WILLIAM JOSHUA BARNEY, New York

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